

# **Information Supporting a Use and Value Determination (UVD) for the Dark River Designated Trout Stream for Class 1B, 3B, and 4A Beneficial Uses**

## ***Minntac Facility***

Prepared for  
United States Steel Corporation



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# Information Supporting a Use and Value Determination (UVD) for the Dark River Designated Trout Stream for Class 1B, 3B, and 4A Beneficial Uses

August 2018

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## Acronyms and Abbreviations

CFR	Code of Federal Regulations
CWA	Clean Water Act
CCft	fish tissue-based chronic criterion
CSft	fish tissue-based chronic standards
DO	dissolved oxygen
EIS	Environmental Impact Statement
FDA	Food and Drug Administration
F-IBI	Fish Index of Biological Integrity
gpm	gallons per minute
HBI	Hilsenhoff Biotic Index
M-IBI	Macroinvertebrate Index of Biological Integrity
MDH	Minnesota Department of Health
MNDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
MSHA	MPCA Stream Habitat Assessment
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated Biphenyls
PFOS	Perfluorooctane Sulfonate
SDS	State Disposal System
SDWA	Safe Drinking Water Act
S.U.	Standard Units
TALU	Tiered Aquatic Life Uses
TDS	Total Dissolved Solids
TRC	Total Residual Chlorine
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UVD	Use and Value Determination

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## Executive Summary

This document provides information to support a request for a “Use and Value Determination” (UVD) for the Dark River designated trout stream, and provides supplemental information as requested by the MPCA in a letter dated April 5, 2018, and subsequently discussed during a May 24, 2018 meeting. United States Steel Corporation (U. S. Steel) is requesting that the MPCA approve this request and commence rulemaking to remove the Class 1B, 3B, and 4A beneficial uses from the Dark River designated trout stream based on the use and value of the waterbody.

This request shows that the Class 1B domestic consumption, Class 3B industrial consumption, and Class 4A agricultural irrigation uses are neither existing nor attainable uses, and that retaining the uses do not result in additional value to the waterbody segment. Removal of these beneficial uses will not result in negative changes to the water quality within the Dark River designated trout stream from the present state. As such, the remaining Class 2A, Class 4B, Class 5, and Class 6 beneficial uses for the Dark River designated trout stream will continue to be existing and attainable uses. Based on the analysis of existing uses, attainable uses, and the use and value of the Dark River designated trout stream, U. S. Steel requests that the MPCA take the following actions for the reasons outlined below:

1. Remove the Class 1B (domestic consumption) use from the Dark River designated trout stream based on the following reasons:
  - A review of public water supplies, self-supplied domestic consumption, and historical imagery show that Class 1B domestic consumption use is not an existing use for the Dark River designated trout stream (Section 6.1).
  - Minnesota Statutes and Rules render the Class 1B domestic consumption designated use unattainable for the Dark River designated trout stream (Section 7.1.1).
    - Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.
    - Minnesota Statutes, section 103G.271, subdivision 1 hinders potential applicants from obtaining a water use permit due to riparian rights. Riparian landowners adjacent to the Dark River designated trout stream do not require domestic water supplies from a surface water source.
    - Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water from the Dark River designated trout stream. A domestic consumption water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical.

- Low flow and natural flow conditions per 40 CFR 131.10(g)(2) render the Class 1B domestic consumption designated use unattainable for the Dark River designated trout stream (Section 7.1.2).
    - The average domestic consumption appropriation in Minnesota is greater than the Dark River designated trout stream mean annual flow; such an appropriation is impossible.
    - The average domestic consumption appropriation in Minnesota is estimated to be greater than the Dark River designated trout stream August flow volume; such an appropriation is impossible.
    - An appropriation for domestic consumption may harm aquatic life uses
  - Populations in the vicinity of the Dark River designated trout stream are not increasing and/or current water supplies are sufficient, such that new water supplies do not need to be sought (Section 7.1.3).
    - In the event that new water sources for nearby towns would need to be identified, the Dark River designated trout stream is unsuitable due to its distance from nearby towns and numerous wetlands in between the towns and the stream.
2. Remove the Class 3B (industrial consumption) use from the Dark River designated trout stream based on the following reasons:
- A review of industrial consumption water appropriations permits and historical imagery show that Class 3B industrial consumption use is not an existing use for the Dark River designated trout stream (Section 6.3).
  - Minnesota Statutes and Rules render the Class 3B industrial consumption designated use unattainable for the Dark River designated trout stream (Section 7.3.1).
    - Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.
    - Minnesota Statutes, section 103G. 285, subdivision 2 limits water appropriations during low flows. Such a limitation would not be acceptable to an industrial appropriator since industrial operations are not seasonally limited. Furthermore, Minnesota Statutes, section 103G.261(a)(5) deprioritizes industrial appropriations making it unlikely that it would be a prioritized use during times of low flow.
    - Minn. Stat 103G.301, subdivision 1 requires potential appropriators to consider alternatives to the proposed water source to be appropriated. Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water

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from the Dark River designated trout stream. An industrial consumption water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical. Groundwater resources would be seen as a preferred alternative.

- Low flow and natural flow conditions per 40 CFR 131.10(g)(2) render the Class 3B industrial consumption designated use unattainable for the Dark River designated trout stream (Section 7.3.2).
  - The average industrial consumption appropriation in Minnesota is a significant portion of the mean annual flow of the Dark River designated trout stream; such that an appropriation could be reasonably expected to cause ecological harm.
  - The average industrial consumption appropriation in Minnesota is greater than 20% of the Dark River designated trout stream August flow volume; such an appropriation is very unlikely to be permitted by the MNDNR because an appropriation of that nature would cause ecological harm during critical months.
  - Industrial appropriators require consistent and reliable water resources to remain profitable. The Dark River designated trout stream would not provide a reliable water source that could guarantee uninterrupted operations.
  - Industrial appropriations are not sourced from low-order streams like the Dark River. As evidenced by a review of the rivers with the highest frequency of industrial appropriations permits, industrial appropriations occur on higher-order streams with consistent base flows.
- 3. Remove the Class 4A (agricultural irrigation) use from the Dark River designated trout stream based on the following reasons:
  - A review of agricultural irrigation water appropriations permits, evidence of wild rice presence, and historical imagery show that the Class 4A agricultural irrigation use is not an existing use for the Dark River designated trout stream (Section 6.4).
  - Minnesota Statutes and Rules render the Class 4A industrial consumption designated use unattainable for the Dark River designated trout stream (Section 7.4.1).
    - Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.
    - Minnesota Statutes, section 103G. 285, subdivision 2 limits water appropriations during low flows. Such a limitation would not be acceptable to an agricultural irrigation appropriator since agricultural operations need to appropriate water during times of drought, which would correspond to when irrigation is most needed to prevent crop loss or failure.

- Minn. Stat 103G.301, subdivision 1 requires potential appropriators to consider alternatives to the proposed water source to be appropriated. Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water from the Dark River designated trout stream. An agricultural irrigation water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical. Groundwater resources would be seen as a preferred alternative.
- Natural flow conditions per 40 CFR 131.10(g)(2) render the Class 4A industrial consumption designated use unattainable for the Dark River designated trout stream (Sections 7.4.2 and 7.4.3).
  - Agricultural irrigation is typically sourced from higher order streams than the Dark River that provide a more consistent year-round baseflow than the Dark River designated trout stream (Section 7.4.3). As evidenced by a review of the rivers with the highest frequency of industrial appropriations permits, industrial appropriations occur on higher-order streams with consistent base flows. This is critical for agricultural operations because when flow is at the minimum is when irrigation use is most critical.
- Agriculture for the purpose of producing truck garden crops (e.g. a profitable commodity) is unattainable near the Dark River designated trout stream because crop productivity is low and such an operation is not economically viable (Section 7.4.4).
- Agricultural irrigation for truck garden crops from a surface water can result in microbial food safety hazards (Section 7.4.5). With the number of wildlife using the Dark River designated trout stream limiting potential contamination sources is impossible.
- The length of growing season limits agriculture for the purpose of producing a profitable commodity (Section 7.4.6). The area around the Dark River trout stream has some of the lowest minimum temperatures and thus one of the lowest plant hardiness zones (Zone 3b) in the contiguous United States. Most crops need a weather management system (i.e. hoop house, high tunnel, etc.) to be able to be planted and harvested within the short growing season. This further illustrates that it is likely uneconomical to have an agricultural irrigation operation in the area of the Dark River designated trout stream.

A summary of the recommendations is included in Table ES-1. U. S. Steel recommends that the Dark River designated trout stream be re-classified as Class 2A, 4B, 5, and 6 designated uses, which will accurately reflect the existing uses, attainable uses, and use and value of the waterbody.

**Table ES-1      Summary of Recommended Actions for Dark River Designated Trout Stream**

Current Use Designation	Recommended for Removal
1B	X
2A	
3B	X
4A	X
4B	
5	
6	

Minnesota Rules, part 7050.0405, subpart 2 specifies requirements by the MPCA Commissioner upon receiving a petition for considering a reclassification of a waterbody's designated uses. Minnesota Rules, part 7050.0405 states:

*Upon receiving a petition, the commissioner has 60 days to reply in writing and indicate a plan for disposition of the petition. The commissioner may request additional information from the petitioner if the request is considered incomplete, in which case the commissioner has 60 days to reply after the additional information is received and the petition is complete. If the commissioner finds that the evidence submitted supports a review of the designated uses, a use attainability analysis must be commenced within six months of the commissioner's reply to the complete petition. The petition becomes part of the use attainability analysis. If the commissioner finds that the use attainability analysis supports a change in use classification, the commissioner shall propose the change through rulemaking.*

U. S. Steel requests that the MPCA respond to this petition within the required timeframe, and commence rulemaking using the recommendations and supporting information in this document.

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# 1 Background

This document provides information to support a request for a “Use and Value Determination” (UVD) for the Dark River designated trout stream, and provides supplemental information as requested by the MPCA in a letter dated April 5, 2018, and subsequently discussed during a May 24, 2018 meeting. United States Steel Corporation (U. S. Steel) is requesting that the MPCA approve this request and commence rulemaking to remove the Class 1B, 3B, and 4A beneficial uses from the Dark River designated trout stream based on the use and value of the waterbody.

This request shows that the Class 1B domestic consumption, Class 3B industrial consumption, and Class 4A agricultural irrigation uses are neither existing nor attainable uses, and that retaining the uses do not result in additional value to the waterbody segment. Removal of these beneficial uses will not result in negative changes to the water quality within the Dark River designated trout stream from the present state. As such, the remaining Class 2A, Class 4B, Class 5, and Class 6 beneficial uses for the Dark River designated trout stream will continue to be existing and attainable uses. Furthermore, downstream waterbodies will not experience adverse impacts as a result of removing the Class 1B, Class 3B, and Class 4A beneficial uses. Beneficial uses downstream of the Dark River designated trout stream will continue to be existing and attainable uses. In contrast, although not attainable, allowing utilization of the waterbody for the Class 1B, Class 3B, and/or Class 4A uses could negatively impact the designated trout stream and the 101(a)(2) uses (*i.e.* Class 2A aquatic life use).

This request and these supporting demonstrations have been developed in accordance with applicable rules and guidance, which include the following:

- 40 CFR 131.10(a) & (k)(3);
- Minnesota Rules 7050.0405;
- the *Water Quality Standards Regulatory Revisions* for the final rule effective on October 20, 2015 (80 FR 51019) which provides more guidance on the “use and value demonstration” described in 40 CFR 131.10; and
- the MPCA letter to U. S. Steel dated April 5, 2018, which outlines additional information needs for U. S. Steel’s Use Attainability Analysis (UAA) or UVD and Site Specific Standard requests.

The requirements for each of these rules and guidance sources are referenced in **bold text** within this document. Specific responses and/or cross-references to appropriately address each requirement related to the rules and guidance have been provided.

The remainder of this section introduces background information for the waterbody covered within this request and provides the framework for this UVD request. Section 1.1 includes general location information on the Dark River designated trout stream for which this request is being made. Section 1.2 identifies the beneficial uses discussed in this request. The approach for which this request and these demonstrations have been based are included in Section 1.3.

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## 1.1 Waterbody Location and Description

The Dark River is located within St. Louis County, Minnesota. The Dark River designated trout stream is a segment of the Dark River that has been designated by the Minnesota Department of Natural Resources (MNDNR) as a trout fishery. The Dark River designated trout stream is located within portions of T 60N, R 20W and T 60N, R 19W and north of the towns of Kinney and Buhl.

The Minntac tailings basin is located at the headwaters of the Dark River. Some water from the tailings basin leaves as surface seepage or as deep groundwater seepage along the western edge of the tailings basin. In 1987, U. S. Steel was issued the currently administratively extended National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permit No. MN0057207 to govern discharges from the Minntac tailings basin. This permit includes monitoring requirements for the surface Outfall SD001, which forms the headwaters of the Dark River and is located on the west side of the tailings basin at the toe.

Timber Creek is a first order stream on the north side of the Laurentian divide that flows north and parallel to the Minntac tailings basin west perimeter dike. The creek enters the Dark River approximately one-half mile downstream of Outfall SD001. The Dark River then flows west, northwesterly approximately 7.5 miles before reaching Dark Lake. The Dark River designated trout stream begins 1.59 miles downstream of Dark Lake where groundwater inputs begin making the Dark River a suitable habitat for cold water fish species. The Dark River designated trout stream continues for 7.91 miles. Knuckey Creek and Leander Creek enter the Dark River within the designated trout stream. Downstream of the Dark River designated trout stream segment, the Dark River continues an additional 1.36 miles before entering the Sturgeon River, which flows north to the Little Fork River. The Little Fork River Watershed is part of the larger Rainy River Watershed. The Dark River designated trout stream is shown on Large Figure 1.

The land area surrounding the Dark River designated trout stream is largely forested. There is limited road or trail access to the Dark River designated trout stream aside from Highway 65 and County Road 688. Public access for recreational purposes is available through property privately owned by PotlatchDeltic Corporation.

## 1.2 Description of Beneficial Uses Assigned to Trout Waters

In Minnesota, the beneficial use classification system is described in Minnesota Rules, chapter 7050. These rules include narrative and numeric water quality standards for the protection of the respective beneficial use, and the protection and attainment of the "physical, chemical, and biological integrity of the waters of the state." Minnesota Rules, part 7050.0140 specifically defines the water classifications applicable in Minnesota.

Designated uses for a waterbody may be applied on a default basis, whereby a use designation process has not been specifically conducted on the waterbody. This is the case with the Dark River designated trout stream. The MPCA adopts the classification of designated trout streams based on MNDNR determinations of waterbodies suitable for the management of cold water fisheries. Trout waters

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identified by the MNDNR in Minnesota Rules, part 6264.0050 are automatically assigned beneficial uses. Minnesota Rules, part 7050.0420 designates trout streams as:

- Class 1B (domestic consumption),
- Class 2A (aquatic life and recreation),
- Class 3B (industrial consumption),
- Class 4A (agricultural irrigation),
- Class 4B (wildlife and livestock),
- Class 5 (aesthetic enjoyment and navigation), and
- Class 6 (other uses) waters.

Because these beneficial uses have been applied to the Dark River designated trout stream automatically, an evaluation, or a beneficial use designation process, has not been applied to this water body. A UVD of these default designations would show that some of these uses are non-existent and unattainable. The use and value demonstration in this document shows that Class 1B, 3B, and 4A uses are neither existing nor attainable, and that the value of retaining these uses could cause harm to the Dark River designated trout stream.

### 1.3 UVD Approach

This document requests removal of the Class 1B (domestic consumption), 3B (industrial consumption), and 4A (agricultural irrigation) beneficial uses from the Dark River designated trout stream. Information used to support removal of these uses is contained within this document. The approach for demonstrating that these beneficial uses are nonexistent and unattainable are based on MPCA's letter dated April 5, 2018. Public documents, data, and information collected by U. S. Steel were reviewed and used to provide information on the use and value of the Dark River designated trout stream, existence and attainability of the beneficial uses assigned to the Dark River designated trout stream in Minnesota Rules and lands adjacent to the Dark River designated trout stream. These sources include:

- fisheries surveys and biological data;
- water quality data;
- flow data;
- water appropriations permits;
- water use data;
- aerial photographs; and
- other key data sources.

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This document presents information to support the UVD of the Dark River designated trout stream and is divided into the following sections:

Section 1 – background and approach

Section 2 – structure of a UVD and justification of U.S. Environmental Protection Agency (USEPA) Federal Regulations and Minnesota Rules

Section 3– relevant Minnesota Rules and guidance from the MPCA

Section 4 – relevant regulations and guidance from the USEPA

Section 5 – supporting data for biological monitoring, Dark River flow data, Dark River water quality, and downstream water quality

Section 6 – evaluation of the existence of currently designated beneficial uses: Class 1B (domestic consumption), Class 2A (aquatic life), Class 3B (industrial consumption), Class 4A (agricultural irrigation), Class 4B (livestock watering and wildlife), Class 5 (aesthetic enjoyment and navigation), and Class 6 (other uses)

Section 7 – evaluation of the attainability of currently designated beneficial uses: Class 1B (domestic consumption), Class 2A (aquatic life), Class 3B (industrial consumption), Class 4A (agricultural irrigation), Class 4B (livestock watering and wildlife), Class 5 (aesthetic enjoyment and navigation), and Class 6 (other uses)

Section 8 – protection of downstream water use classifications, including Class 2B, Class 3C, Class 4A, Class 4B, Class 5, and Class 6

Section 9 – recommendations

Section 10 – references

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## 2 UVD Structure and Justification

The passage of the Clean Water Act (CWA) in 1972 established the goal of restoring and maintaining the “chemical, physical, and biological integrity” of surface water “where attainable” through water quality standards. Water quality standards consist of specific designated uses linked to measurable criteria that are used as benchmarks to establish whether the designated uses of a specific waterbody are being protected. The CWA places the responsibility of adopting designated uses and corresponding water quality criteria on individual states.

In Minnesota, the classification system of beneficial uses is described in Minnesota Rules, chapter 7050. These rules define the classification system and include narrative and numeric water quality standards for the protection of the beneficial uses, and thereby protect the “physical, chemical, and biological integrity of the waters of the state.”

This section of the document provides both the purpose and information regarding the regulatory framework under which a UVD may be applied to the Dark River designated trout stream.

### 2.1 USEPA Federal Regulations and Guidance Supporting Removal of a Use

Federal regulation in 40 CFR 131.3(e) requires the protection of designated uses that exist or have existed after November 28, 1975 and places the responsibility of removing, or creating sub-categories of designated beneficial uses that have not existed, do not exist, and are not expected to exist on individual States.

40 CFR 131.10 describes the designation of uses and specifies criteria for removal of uses. States may remove a designated use which is not an existing use or establish sub-categories of a use if the State can demonstrate that attaining the designated use is not feasible. The requirements for removing a 101(a)(2) designated uses (*i.e.* fishable/swimmable uses) through a use attainability analysis (UAA) removal petition are described in 40 CFR 131.10(g). A UAA is defined as a structured scientific assessment showing that attainment of the use is not feasible because of one of the six factors specified in 40 CFR 131.10(g). The six factors that may be used to demonstrate that attaining a use is infeasible are:

- (1) *Naturally occurring pollutant concentrations prevent the attainment of the use; or*
- (2) *Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements to enable uses to be met; or*
- (3) *Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or*

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- (4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or*
  - (5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or*
  - (6) Controls more stringent than those required by Sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.*

40 CFR 131.10(k) specifies that for non-101(a)(2) (i.e. non-fishable/non-swimmable) uses a UAA is discretionary, and instead a petitioner may submit “documentation justifying how its consideration of the use and value of water” supports removal of the specified use. Unlike a UAA, a UVD can focus on additional justifications beyond the six factors to support removal of a use. It is worth noting, that the 40 CFR 131.10(g) factors could also be used as part of the justification for removing a use through a UVD.

Because the Class 1B, 3B, and 4A uses are non-101(a)(2) uses and additional reasons beyond the six factors in 40 CFR 131.10(g) justify the removal of these uses from the Dark River designated trout stream, this request is based on the UVD format. The justification for removing the uses from the Dark River designated trout stream based on the “use and value” of the waterbody is included in Section 7.1 for Class 1B domestic consumption, Section 7.3 for industrial consumption, and Section 7.4 for agricultural irrigation.

## **2.2 Minnesota Rules and Guidance Supporting Removal of a Use**

Minnesota Rules, part 7050.0405 governs the procedure for reclassification of beneficial uses for waterbodies in Minnesota, which is consistent with either a UVD or UAA approach. Minnesota Rules, part 7050.0405, subpart 1 allows a petitioner to “present evidence to the agency that a beneficial use assigned to a water body in this chapter does not exist or is not attainable and consider a reclassification of that water body...” In addition to providing evidence that a use “does not exist or is not attainable”, the rule requires the petitioner to submit the information required in Minnesota Rules, part 7050.0405, subpart 1, items (A) through (E). Section 3 outlines this information and provides responses in accordance to Minnesota Rules.

Minnesota Rules, part 7050.0405, subpart 2 requires the commissioner to reply in writing and indicate a plan for disposition of the petition within 60 days. Minnesota Rules also states that “If the commissioner finds that the evidence submitted supports a review of the designated uses, a use attainability analysis must be commenced within six months of the commissioner’s reply to the complete petition.” Per the Rule “The petition becomes part of the use attainability analysis.” Furthermore, “If the commissioner finds that the use attainability analysis supports a change in use classification, the commissioner shall propose the change through rulemaking.”

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## 3 Minnesota Rules and Guidance

This section includes information from the State of Minnesota regarding the UAA or UVD process. Section 3.1 includes Minnesota Rules requirements to consider attainability of a use and information in response to and in accordance with these requirements. Section 3.2 includes information required by the MPCA in the April 5, 2018 letter received by U. S. Steel and information in response to and in accordance with these requirements.

### 3.1 Minnesota Rules, part 7050.0405

Minnesota Rules, part 7050.0405 allows an outside party to consider attainability of a use. U. S. Steel has provided the following information as required and in accordance with the rule:

#### **A. The name and address of the petitioner**

This petition was prepared by U. S. Steel Minntac with assistance from Barr Engineering Co.

Ms. Chrissy Bartovich  
Director – Environmental / Minnesota Ore Operations  
United States Steel Corporation  
P.O. Box 417  
Mt. Iron, MN 55768

#### **B. the name, location, and description of the water body**

The waterbody included in this request is the Dark River designated trout stream. The Dark River designated trout stream is identified in Minnesota Rules, part 6264.0050, subpart 4.NN.(23) as including T60N R19W Sections 19, 20, 30 and T60N R20W Sections 10, 11, 12, 13, 24. According to the 2018 St. Louis County Public Land Survey System, the most downstream portion is also included in T60N R20W Section 3. The Dark River designated trout stream begins 1.59 miles downstream of Dark Lake and continues for 7.91 miles. The Dark River continues an additional 1.36 miles before entering the Sturgeon River, which flows north to the Little Fork River. The Little Fork River Watershed is part of the larger Rainy River drainage basin. The Dark River designated trout stream is included in Large Figure 1.

#### **C. the specific designated use or uses that do not exist or are unattainable in the water body and the reasons they do not exist or are unattainable**

The specific designated uses that do not exist *and* are unattainable include Class 1B domestic consumption, Class 3B industrial consumption, and Class 4A agricultural irrigation for the Dark River designated trout stream. The reasons that these uses do not exist are included in Section 6.1 for the Class 1B use, Section 6.3 for the Class 3B use, and Section 6.4 for the Class 4A use. The reasons that these uses are unattainable are included in Section 7.1 for the Class 1B use, Section 7.3 for the Class 3B use, and Section 7.4 for the Class 4A use.

**D. the reasons the current use classification is causing harm, unnecessary expense, or other hardship to the petitioner.**

The costs required to guarantee compliance presents a hardship that others in the state and industry do not share. U. S. Steel has previously evaluated the feasibility and costs of installing and operating a water treatment system for treatment of process water.

Following MPCA and USEPA guidance and working through USEPA's worksheets on financial evaluation (<https://www.epa.gov/sites/production/files/2016-03/documents/econworksheets-complete.pdf>), it was determined that the requirement to install treatment would have a significant financial impact on the company. The water treatment equipment necessary to meet the water quality standards is estimated to require approximately \$130M (million) in capital with a yearly operating and maintenance cost of approximately \$9M. This is not including an escalator for the substantial increases in electrical power for the additional 20+MW of power needed to operate the technology. The interest rate for financing used in the calculations was 7.4% for 10 years. This resulted in a yearly cost of \$28M for the installation, operation and maintenance of the water treatment equipment.

Based on the financial analysis, installation of water treatment equipment will have a substantial negative impact to profits of the company that is competing in a global economy. The fact that the installation of the water treatment equipment has a direct effect on profitability of the company could also have a widespread economic impact to the region (St. Louis County) as well. The region currently has an unemployment rate of 6.9%, well above the national average of 4.8%. Approximately 1,400 people are employed at Minntac, thus the unemployment rate of this region could increase significantly if water treatment equipment was mandated. In addition to the unemployment rate, the local tax revenues would also decrease dramatically while the need for social services would climb. Current tax revenue in St. Louis County is approximately \$128M with \$52M of that money being spent on social services. Minntac pays approximately \$33M per year in production tax to the State of Minnesota who then redistributes those dollars throughout the state to local school districts, communities, counties, etc. Minntac is the largest taconite pellet producer in Minnesota, responsible for approximately 38% of the taconite taxes paid to the State of Minnesota, and is the largest contributor (approximately 90%) to the State School Trust Fund.

**E. any additional supporting evidence including, but not limited to, water quality, hydrological, and other relevant data; pictures; testimony of local residents; survey results; and resolutions or actions by local organizations or governmental entities.**

Water quality data in support of this UVD are included in Section 5.3. Water quality data shows attainment of Class 2A water quality standards.

Hydrological flow data are included in Section 5.2. Flow data show that natural or low flow conditions per 40 CFR 131.10(g)(2) prevent attainment of sufficient appropriation for Class 1B, 3B, or 4A uses, and that such appropriations would harm or contribute to harm of the Class 2A beneficial uses within the Dark River designated trout stream. Adequate flow is crucial to supporting fishable, swimmable uses, and thus attainment of the other uses precludes attainment of 101(a)(2) uses. This discussion is included in Section 7.1.2 and 7.3.2.

Biological monitoring data are included in Section 5.1. These data support that the aquatic life present in the Dark River designated trout stream meets or exceeds aquatic life standards when compared to Minnesota Rules as well as other nearby streams and comparative indices. The biological data demonstrates that removal of the Class 1B, 3B, and 4A uses will not result in changes to water quality or aquatic life uses (Class 2A use or downstream Class 2B). This discussion is included in Sections 5.3, 5.47.1.4, 7.3.3, and 7.4.7.

Minnesota Statutes provide additional supporting evidence, demonstrating that the Class 1B, 3B, and 4A uses are not attainable. Minnesota Statutes prohibit the appropriation of water on a permanent basis from designated trout streams. This evidence and other administrative statutes and rules that prohibit or limit attainment of these uses are described in Sections 7.1.1, 7.3.1, and 7.4.1.

### 3.2 April 5, 2018 Letter from MPCA to U. S. Steel

The April 5, 2018 letter from MPCA to U. S. Steel outlined certain requirements for demonstrating removal of a use through a UAA or UVD. This letter is included as Appendix A. The following information has been provided consistent with the letter requirements and requests:

MPCA requested that U. S. Steel ensure that data and documentation be provided to support the ability for MPCA to make the demonstrations listed below. The USEPA requires states to make certain demonstrations in order to approve a UAA or UVD. The requirements are included in **bold text** followed by U. S. Steel responses that are consistent with these demonstrations:

- **That all other standards, including narrative standards, will be met in the reaches that are the subject of the petitions;**

U. S. Steel is not requesting the removal of the Class 2A, 4B, 5, or 6 beneficial uses. Available data show that these classes' numeric and narrative standards are met in the Dark River designated trout stream. A summary of the Class 2A, 4B, 5, and 6 numeric standards are included in Section 5.3.1. A summary of the Class 2A narrative standards applicable to the Dark River designated trout stream and evidence supporting that these narrative standards are met is included in Section 6.2.

- **That the removal of the use or the change to the standard will not prevent the attainment and maintenance of the water quality standards of downstream waters, per 131.10(b) and Minnesota Rules, part 7050.0155**
  - **Having different standards for adjoining reaches does not necessarily show that downstream standards will not be met, but MPCA must be able to demonstrate that Minntac's effluent, under the conditions assumed if the petitions are successful, will not cause or contribute to an exceedance of water quality standards in downstream waters;**

Section 5.3.1 and Section 5.4 demonstrates that water quality standards associated with uses not being requested for removal from the Dark River designated trout stream are met within the Dark River designated trout stream. Section 5.4 demonstrates that monitoring results from these

parameters downstream of the Dark River designated trout stream show that water quality standards are also being met downstream. Furthermore, water quality parameters associated with the uses requested for removal (Class 1B, 3B, and 4A) are also met downstream of the Dark River designated trout stream. Refer also to Section 8 for a summary demonstrating that downstream waters are protected.

On a monthly basis, U. S. Steel is monitoring flow and water quality for select Class 2 parameters at D-1A. U. S. Steel is also monitoring to show compliance with water quality standards associated with uses requested for removal at two locations downstream of the Dark River designated trout stream. These data are available in Section 5.4.1. The water quality data demonstrates that water quality standards are being met in downstream waters, and thus that the downstream designated uses are protected. Also, it is important to note that administrative removal of the Class 1B, 3B, and 4A beneficial uses will not result in any changes to water quality for either the Dark River designated trout stream or downstream waters. These data show that the tailings basin does not cause or contribute to an exceedance of water quality standards downstream of the Dark River designated trout stream.

- **When removing a use, that the specified use is not an existing use (on or after November 28, 1975) in the reach;**

The Class 1B, 3B, and 4A designated uses are not existing uses. Evidence demonstrating that these uses are not existing uses on or after November 28, 1975 are included in Section 6.1 for Class 1B, Section 6.2 for Class 3B, and Section 6.4 for Class 4A.

**MPCA requests additional information for the following specific areas, to support the demonstrations described above:**

- **Biological Monitoring – Biological monitoring must be consistent with the MPCA’s standard operating procedure and the information in the most recent *Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List*, particularly Appendix F.**

Appendix F of MPCA’s Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: a 305(b) Report and 303(d) List (reference (1)) references Minnesota Rules, part 7050.0150, subpart 6, which includes the Class 2 narrative standards. The comparison of the Class 2 narrative standards to the Dark River designated trout stream are included in Section 6.2. Biological monitoring was conducted in 2017 by GEI Consultants on behalf of U. S. Steel (reference (2)) and in 2018 in conjunction with the MPCA. These data, as well as data collected by public agencies, are included in Large Table 1 and a discussion is included in Section 5.1.

- **Additional Pollutant Monitoring**

- **Monthly monitoring of specific conductivity, TDS, sulfate, bicarbonate and hardness in the upper Dark River (SD001 and D-1), Dark Lake, Dark River trout reach, Timber Creek, headwaters of Sand River and Admiral Lake.**

The Dark River designated trout stream D-1A station is the only additional pollutant monitoring station applicable to this request. The other referenced stations are located upstream of or within a separate watershed from the Dark River designated trout stream (D-1A). Monitoring data for the Dark River designated trout stream D-1A station is summarized in Section 5.3.1. These data were collected quarterly from fourth quarter 2011 to first quarter 2015. Monthly data collection for these parameters was initiated and is occurring on the Dark River designated trout stream at D-1A beginning the second quarter 2018.

- **Demonstration of protection of other standards and downstream uses**

- **Consideration of the Class 3B use on the trout reach of the Dark River, particularly the hardness standard – this has not been included in the information received by MPCA to date;**

This document includes the request for removal of the Class 3B industrial consumption use from the Dark River designated trout stream. Evidence supporting the use and value (40 CFR 131.10(k)) of the Class 3B use and evidence supporting that the Class 3B use “does not exist and is not attainable” (Minnesota Rules, part 7050.0405) are included in Section 6.2 and 7.3, respectively.

Water quality of the Dark River designated trout stream, including hardness, is discussed in Section 5.3 and Section 5.4.

- **Data for specific conductivity, TDS, hardness, and bicarbonate, on downstream waters where the Class 3 and 4 designated uses would remain unchanged, to demonstrate that the current standards are met;**

Section 5.3.1 includes a summary of specific conductivity, TDS, hardness, bicarbonate, which have exceeded water quality standards, as well as a summary of other Class 3 and Class 4 parameters data at the D-1A monitoring station. D-1A is located at the upstream edge of the Dark River designated trout stream (Large Figure 2). Based on collected monitoring data, Class 3C and Class 4A water quality standards are met at the downstream extent of this request (downstream of the Dark River designated trout stream). Refer also to Section 5.4.1 for a summary of collected downstream monitoring data.

- **TDS and sulfate information demonstrating the proposed site specific standards would be met in all requested waters, including the headwaters of Sand River, Admiral Lake, Timber Creek, and Dark Lake;**

This information is not applicable to this request. Site-specific standards are outside the scope of this request.

- **TDS, specific conductivity, bicarbonate and sulfate information demonstrating the current 4C standards and the proposed site specific standards would be met in representative wetland locations (identified below);**

The representative wetlands are located adjacent to the Minntac tailings basin, which is upgradient from the Dark River designated trout stream. Because these wetlands are located upgradient they are not applicable to this request, and are not required to be addressed by federal or state rules or guidance. Site-specific standards are outside the scope of this request.

- **Information demonstrating that the drinking water use in groundwater would still be protected if the Class 1B use is removed from the trout reach of the Dark River;**

The Dark River designated trout stream is characteristic of a cold water fishery, such that it is a gaining stream with groundwater inputs (reference (3)). Gaining streams are characterized as receiving groundwater inputs that add to the overall stream flow rather than streams that exchange water from the stream to the aquifer. Because the Dark River designated trout stream gains groundwater inputs there will be no impact to the surrounding groundwater quality as a result of removing the Class 1B use from the Dark River designated trout stream. Additionally, it is important to note that no changes will occur to water quality as a result of removing the Class 1B use from the Dark River designated trout stream.

- **Information demonstrating that applicable Class 2D, Class 5, and Class 6 uses, as well as the narrative in Minnesota Rules, part 7050.0186, subpart 1, are met in wetlands surrounding the tailings basin. MPCA proposes three representative locations, one on each of the west, north, and east sides of the basin. Possible locations could include, as referenced from the 2017 Tailings Basin Status Report (February 2018), Inspection points 1, 16, and 29; and**

The representative wetlands are located adjacent to the Minntac tailings basin, which is upgradient from the Dark River designated trout stream. Because these wetlands are located upgradient, they are not applicable to this request.

- **Information demonstrating that the Class 2 narrative standard (Minnesota Rules, part 7050.0150, subpart 3) is being met in all surface waters affected by the tailings basin.**

Class 2 narrative standards are addressed for the Dark River designated trout stream in Section 6.2. Waters upstream of the Dark River designated trout stream (e.g. the upper Dark River and Timber Creek) are not applicable to this petition. Because Class 2 narrative standards are met in the Dark River designated trout stream, it is unreasonable to assume that surface waters downstream of the Dark River designated trout stream would not meet Class 2 narrative standards due to impacts from the tailings basin. There are numerous other factors (i.e. other tributaries, groundwater inputs) associated with attainment of Class 2 narrative standards downstream of the Dark River designated trout stream that are not applicable to the Minntac tailings basin surface seepage. A summary of downstream Class 2A

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specified parameters is included in Section 5.4.1 and Class 2 standards for downstream waters are addressed in Section 8.1.

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## 4 USEPA Regulations and Guidance

This section includes information from the USEPA regarding the UAA or UVD process.

### 4.1 40 CFR 131.10

This section includes Federal regulations on designation of uses and responses in accordance with these requirements.

*(a) Each State must specify appropriate water uses to be achieved and protected. The classification of the waters of the State must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. If adopting new or revised designated uses other than the uses specified in section 101(a)(2) of the Act, or removing designated uses, States must submit documentation justifying how their consideration of the use and value of water for those uses listed in this paragraph appropriately supports the State's action. A use attainability analysis may be used to satisfy this requirement. In no case shall a State adopt waste transport or waste assimilation as a designated use for any waters of the United States.*

*(k) A State is not required to conduct a use attainability analysis whenever:*

*(3) The State wishes to remove or revise a designated use that is a non-101(a)(2) use. In this instance, as required by paragraph (a) of this section, the State must submit documentation justifying how its consideration of the use and value of water for those uses listed in paragraph (a) appropriately supports the State's action, which may be satisfied through a use attainability analysis.*

This document is a petition supporting a UVD in order for the MPCA to take into consideration the use and value of the Dark River designated trout stream. This petition is for the removal of non-101(a)(2) uses, including the Class 1B domestic consumption, Class 3B industrial consumption, and Class 4A agricultural irrigation uses, such that the UVD format is consistent with federal regulation. This document includes demonstrations under the UVD format, and also includes information with regards to the 40 CFR 131.10(g)(2) use attainability analysis factor due to “*Natural ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met*”. This is allowable under Federal Register Guidance (reference (4)) included in Section 4.2.

### 4.2 Federal Register Guidance

This section includes information about use and value demonstrations for non-101(a)(2) uses and information in response to the Federal Register guidance.

The MPCA recommended in the April 5, 2018 letter that U. S. Steel review Water Quality Standards Regulatory Revisions; Final Rule, published in the Federal register on August 21, 2015 – 80 FR 50126 (reference (4)) for information on conducting a Use and Value Determination. The following information in **bold** text is guidance from the Final Rule. U. S. Steel understands that the information is for the intent of individual States, but has included some of this information because it pertains to the demonstration that the MPCA needs to make to the USEPA.

**EPA recommends states and authorized tribes also consider a suite of other factors, including, but not limited to:**

- 1. Relevant descriptive information (e.g., identification of the use that is under consideration for removal, location of the water body/waterbody segment, overview of land use patterns, summary of available water quality data and/or stream surveys, physical information, information from public comments and/or public meetings, anecdotal information, etc.)**

Relevant descriptive information is included in this request. The list addressed in the Federal Register are included here with the associated references.

- The Class 1B, 3B, and 4A uses are the identified uses under consideration for removal (also discussed in Section 1).
- The water body location is identified in Section 1.1.
- Land use patterns within the Dark River watershed are discussed in Section 6.1.3 and shown on Large Figure 1.
- A summary of available water quality data is presented in Section 5.3.
- A summary of biological stream surveys is available in Section 5.1, which also includes habitat information and physical stream characteristics.
- Information from public comments and/or public meetings is not applicable to this request. No public involvement has been solicited to date.

- 2. Attainability information (i.e., the § 131.10(g) factors as described previously, if applicable),**

The 40 CFR 131.10(g)(2) factor “Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements to enable uses to be met”. Specifically, natural and low flow conditions prevent appropriation of water from the Dark River designated trout stream, which would be required for Class 1B and 3B and 4A beneficial uses. Flow data for the Dark River designated trout stream are presented in Section 5.2. A discussion regarding low flow and natural conditions on the Dark River designated trout stream that prevent attainment of the Class 1B use is included in Section 7.1.2 and the Class 3B is included in Section 7.3.2.

This UVD also considers other factors or reasons not included in 40 CFR 131.10(g) for removing the Class 1B, 3B, and 4A uses from the Dark River designated trout stream. These other factors or reasons contribute to an overall assessment of the use and value of the Dark River designated trout stream, whereby the existence and/or attainment of these uses would result in impacts to 101(a)(2) uses (e.g. Class 2A). Such impacts would jeopardize the Dark River designated trout stream as one of the premier trout streams in the Grand Rapids, Minnesota Fisheries Management Area. The existence and/or attainment of these uses would also negate the original purpose of the application of the Class 1B and 3B beneficial uses, which was to provide for a "higher degree of natural protection." Such a reasoning for applying these designations is antiquated, inconsistent with Minnesota Statute, and unattainable without causing harm to the aquatic life use. Further discussion on attainability of the Class 1B, 3B, and 4A uses is included in Section 7.1, 7.3, and 7.4, respectively.

### **3. Value and/or benefits (including environmental, social, cultural, and/or economic value/benefits) associated with either retaining or removing the use, and**

Retaining the Class 1B, 3B, or 4A uses for the Dark River designated trout stream do not add any environmental, social, and/or economic value/benefits. These designated uses do not have a positive environmental value or benefit to the Dark River designated trout stream. As described in Section 6.1, the Class 1B use designation is likely a "hold over" from 1973 when more stringent standards that were not scientifically based were applied to water bodies for a "higher degree of natural protection." The Class 2A use and 2Ag designation appropriately protects the environment (e.g. aquatic life uses) for the Dark River trout stream. Section 5.3.2 provides a list of the parameters and their respective ranges that are crucial for trout communities; none of these parameters are specific to and/or only included in the Class 1B, 3B, or 4A water quality standards.

The Class 1B, 3B, or 4A uses do not add social value and/or benefits to the Dark River designated trout stream. The Class 1B use is unnecessary because there is no need for additional public water supply within the region both from a social population perspective as demonstrated in Section 7.1.3 and from a vicinity to a population requiring a public drinking water supply as discussed in Section 6.1.1 and 6.1.2. As such, there is no social benefit to retaining this designated use. Retaining the Class 3B use jeopardizes the use of the Dark River designated trout stream for recreation, including trout fishing because critical habitat would be disrupted from low flow. Both trout fishing and recreational opportunities on/within the Dark River designated trout stream have significant social, cultural, and economic benefits to the area. Similarly, the Class 4A use provides no social or cultural value as the area is not socially or culturally dependent on agriculture.

Retention of the Class 1B, 3B, and 4A uses negatively impacts the economic value and benefits to the region. Although not the only reason for requesting removal of the Class 1B use, not removing the use and retaining the use causes economic hardship and harm to U. S. Steel. Installation of water treatment equipment to meet a non-existent and unattainable use will have a substantial negative impact to profits for a company that is already facing challenging conditions in the global economy. The fact that the installation of the water treatment equipment has a direct effect on profitability of the company could

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also have a widespread economic impact to the region (St. Louis County) as well. Further discussion on the economic impacts related to retaining the use are included in Section 3.1.

#### **4. Impacts of the use removal on other designated uses.**

Removal of the Class 1B, 3B, and 4A uses do not impact other designated uses because no changes to water quality will occur as a result of this administrative action. A discussion on attainment of the beneficial uses downstream of the Dark River designated trout stream are included in Section 8. Section 5.3.2 also shows that the water quality parameters associated with these uses requested for removal are not critical to the health of cold water fisheries.

The existing water quality data from D-1A within the Dark River designated trout stream (Large Figure 1) show that water quality standards for parameters not associated with the uses requested for removal are being met. Biological surveys show that Class 2 narrative standards are met in the Dark River designated trout stream.

In addition, the information provided in response to the demonstrations required by individual States to the USEPA, the Federal Register outlines an example of information and data included in a UVD for removal of a public drinking water supply designation. Because this petition includes the request to remove a domestic consumption designation, the applicable data from the Federal Register example are included in this request. The Federal Register example includes providing documentation demonstrating that:

- The public water supply is not an existing use (Section 6.1)
- The nearby population uses an alternative drinking water supply (Sections 6.1.2 and 7.1.3)
- Projected population trends suggest that the current supply is sufficient to accommodate future growth (Section 7.1.3)

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## 5 Supporting Data

The following sub-sections provide background information on relevant biological, physical, and chemical characteristics of the Dark River designated trout stream.

### 5.1 Biological Monitoring

The following sections include biological data for the Dark River designated trout stream consistent with the MPCA's Tiered Aquatic Life Uses (TALU) framework and Appendix F of the *Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List* (reference (1)). Fish, macroinvertebrate, and habitat surveys have been conducted upstream, within, and downstream of the Dark River designated trout stream. Monitoring efforts conducted by GEI consultants on behalf of U. S. Steel (reference (2)) and by various public agencies have all demonstrated that the Dark River designated trout stream meets or exceeds values for biological indices established for Northern Minnesota streams. A summary of these data is included in this section as well as in Large Table 1 and Large Table 2.

Fish, macroinvertebrate, and habitat assessments and the corresponding indices for the Dark River designated trout stream indicate a diverse, healthy biological community within the water body. The Dark River designated trout stream either exceeds or meets Class 2Ag general cold water aquatic life and habitat criteria in Minnesota Rules, part 7050.0222, subpart 2d. Because indices demonstrate that the Dark River designated trout stream is "*capable of supporting and maintaining a balanced, integrated, adaptive community of cold water aquatic organisms*" this also demonstrates that aquatic life are not impacted by the existing water quality. The assessment of aquatic life for the Dark River designated trout stream confirms the protection of trout and that the Class 2A and Class 2Ag designations are both existing and attainable. A discussion on the Class 2 narrative standards is also included in Section 7.2.2.

#### 5.1.1 Fish Biological Monitoring

The Dark River designated trout stream is considered an important brook trout fishery in northeastern Minnesota and one of the best trout streams in the Grand Rapids Fisheries Management Area with self-sustaining populations of brook trout. The MNDNR ceased stocking trout in 1991, after a 1990 MNDNR survey found populations to be self-supporting (reference (3)). The MNDNR maintains an angling easement on a section of stream within the PotlatchDeltic Corporation property to allow public access to the Dark River.

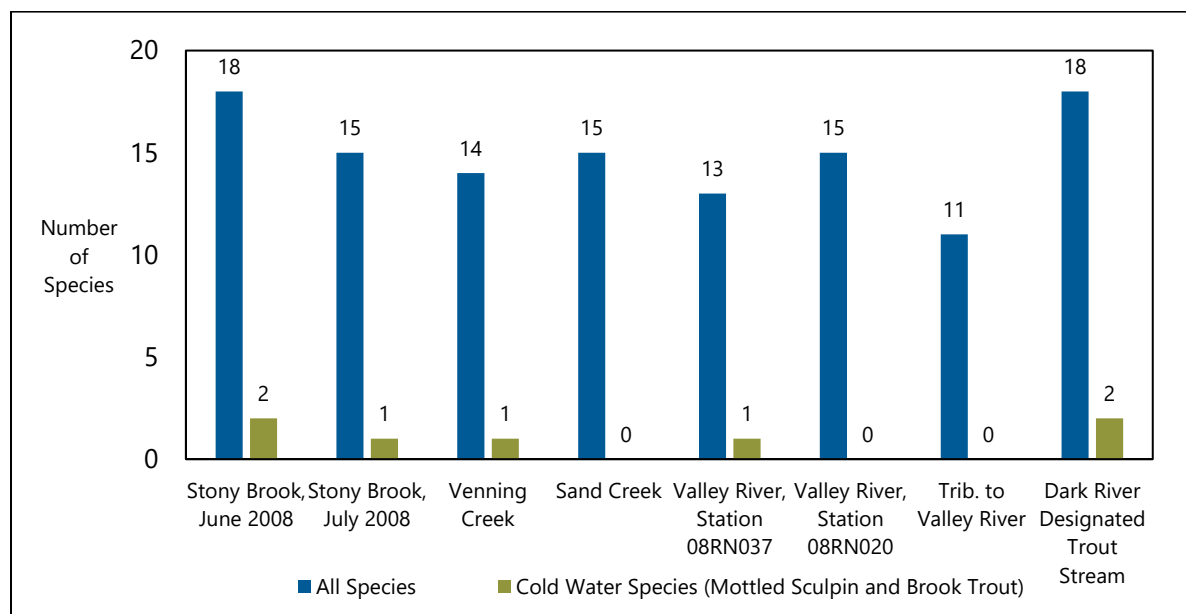
This section describes fish surveys conducted in reaches within and downstream of the Dark River designated trout stream, as well as in other cold water streams within the Little Fork River Watershed. Fish biological monitoring reference sources in this section include data from surveys for the Minntac Water Inventory Reduction Environmental Impact Statement (EIS) (reference (3)), the MPCA's intensive Little Fork River Watershed Monitoring and Assessment Report (WMAR) (reference (5)), the MNDNR's Dark River Habitat Restoration Project (reference (6)), and Minntac's 2017 Biological Survey Report (reference (2)). Fish species abundance and diversity and the Fish Index of Biological Integrity (F-IBI) are metrics used to evaluate the biological condition of the Dark River designated trout stream.

### 5.1.1.1 Fish Species Abundance and Diversity

The Minntac Water Inventory Reduction EIS compiled fish survey data from multiple MNDNR surveys of the Dark River conducted between 1983 and 2000 (reference (3)). From the surveys, twenty-six species were captured in the Dark River designated trout stream, including brook trout (*Salvelinus fontinalis*) and mottled sculpin (*Cottus bairdi*), two cold water fish species.

Fish surveys for the Little Fork River watershed were conducted in 2005 and 2008 to determine the F-IBI of each monitoring station (reference (5)). Fish surveys occurred at designated “stations” throughout the watershed, including station 99NF120, located within the Dark River designated trout stream (Large Figure 2). Additional cold water streams within the Little Fork River Watershed are also referenced in this document (Large Figure 3).

Figure 5-1 displays the number of species surveyed at cold water reaches within the Little Fork River Watershed. The Dark River designated trout stream and Stony Creek (June 2008 survey) had the greatest number of fish species surveyed of all cold water streams within the watershed and were the only two streams to identify both brook trout and mottled sculpin. Large Table 1 provides information how frequently each fish species was collected during the sampling events at sites downstream of and within the Dark River designated trout stream. The monitoring locations within the Little Fork River Watershed are included in Large Figure 3.



**Figure 5-1 Number of Fish Species Surveyed by MPCA in 2008 in Cold Water Streams in the Little Fork River Watershed**

The MNDNR also performed annual fish surveys on the Dark River designated trout section between 2004 and 2008 for a planned, but never executed, habitat restoration project (reference (7), reference (8)). Fish diversity from the MNDNR surveys is consistent with data gathered for the Little Fork WMAR

(reference (5)). The fish species present and each species' abundances for the Dark River survey locations in 2008 are provided in Large Table 1. The MNDNR survey locations are included in Large Figure 2.

#### **5.1.1.2 F-IBI and Fish Biocriterion Comparison**

The Little Fork River WMAR (reference (5)) includes F-IBI scores for the stations within and downstream of the Dark River designated trout stream, and other cold water streams within the Little Fork River Watershed (Large Figure 2 and Large Figure 3). The nearest downstream location from station 99NF120, located approximately 7.7 river miles downstream, is station 05RN059 on the Sturgeon River (Large Figure 2). In addition to the Dark River, station 05RN059 receives flow from the East Branch of the Sturgeon River, Paavola Creek, and Gilmore Creek. These data are included in Large Table 2. At the time of publication of the Little Fork River WMAR (reference (5)), F-IBI thresholds and upper confidence limits for comparing the scores were available for warm water streams, but not cold water streams due to the lack of available cold water evaluation criteria (reference (5)). Therefore, F-IBI thresholds and upper confidence limits comparison criteria were unavailable for the Dark River designated trout stream.

Instead of using F-IBI thresholds and confidence limits as references, F-IBI scores from other cold water streams within the Little Fork River Watershed can serve a similar purpose. Large Table 2 includes a summary of data for other cold water streams. A comparison of the data indicates that the F-IBI scores for Dark River designated trout stream are similar to or higher than other F-IBI scores for other cold water streams within the Little Fork River Watershed (reference (5)).

TALU rules replaced F-IBI thresholds and confidence limits with biocriterion. The F-IBI scores for the cold water streams, including the Dark River designated trout stream, are compared with the biocriterion for northern cold water streams (Class 2Ag) in Large Table 2. As indicated in Large Table 2, the Dark River designated trout stream is one of two Class 2Ag waters in the Little Fork River Watershed to have a F-IBI score (June 2008 F-IBI) exceed the applicable biocriterion, while the August 2008 F-IBI score for the Dark River designated trout stream is one point below the applicable biocriterion.

The Dark River and Sturgeon River downstream of the Dark River designated trout stream are considered Class 2Bg streams, which are "general cool and warm water aquatic life or habitat" streams. Data show that downstream aquatic uses are also attained; the F-IBI score for the nearest downstream monitoring station, 05RN059 on the Sturgeon River, exceeds both the F-IBI respective threshold's upper confidence limit and the biocriterion.

F-IBI scores from biological monitoring conducted in 2017 for Minntac by GEI Consultants (reference (2)) within and downstream of the Dark River designated trout stream exceeded TALU biocriterion and thresholds, as indicated in Large Table 2.

#### **5.1.1.3 Fish Biological Monitoring Summary**

As shown in this section, survey data support that the Dark River designated trout stream meets or exceeds biological criteria for lotic cold water general streams for fish assemblages, with the exception of one F-IBI score, which falls one point short of the biocriterion (Minnesota Rules, part 7050.0222, subpart 2d). Downstream of the Dark River designated trout stream, the Sturgeon River also meets

biological criteria (Minnesota Rules, part 7050.022, subpart 3d), which shows that downstream uses are attainable. In addition, F-IBI scores to assess fish assemblages at monitoring stations in Dark River received equivalent, if not higher, ratings than other cold water streams within the Little Fork River Watershed. Qualitatively, this assessment also supports the Dark River designated trout stream as an important trout fishery in northeastern Minnesota.

## 5.1.2 Macroinvertebrates Biological Monitoring

This section describes macroinvertebrate surveys conducted in reaches within and downstream of the Dark River designated trout stream as well as in other cold water streams within the Little Fork River Watershed. Macroinvertebrate biological monitoring reference sources in this section include data from surveys completed by the MNDNR (reference (7), reference (8)); the MPCA's intensive Little Fork River Watershed Monitoring and Assessment Report (WMAR) (reference (5)); the MPCA watersheds web database (reference (9)), and Minntac's 2017 Biological Survey Report (reference (2)). Hilsenhoff Biotic Index (HBI) and Macroinvertebrate Index of Biological Integrity (M-IBI) are metrics used to evaluate the biological condition of the Dark River designated trout stream.

### 5.1.2.1 HBI

Macroinvertebrate studies have been conducted by the MNDNR (reference (10)), the MPCA (reference (9)), and GEI Consultants (reference (2)) within and downstream of the Dark River designated trout stream and on other cold water streams within the Little Fork River Watershed; HBI scores were calculated using the macroinvertebrate data from these sites. The HBI is a standard metric for assessing water quality through benthic macroinvertebrates (reference (11)). The HBI score calculated for each site indicates the quality of water as shown in Large Table 2. The rating system used to evaluate water quality using HBI scores is provided in Table 5-1.

**Table 5-1 HBI Score Ranges and Water Quality Evaluations**

HBI Score Range	Water Quality Evaluation Rating
0.00 – 3.50	Excellent
3.51 – 4.50	Very Good
4.51 – 5.50	Good
5.51 – 6.50	Fair
6.51 – 7.50	Fairly Poor
7.51 – 8.50	Poor
8.51 – 10.00	Very poor

The MNDNR conducted macroinvertebrate surveys at four sites (Sites 1 through 4) within the Dark River designated trout stream in 1999 and 2000 (reference (12)). HBI scores for Dark River Sites 1 through 4 indicated good to very good water quality. The MNDNR also conducted macroinvertebrate surveys from 2004 through 2008 in the Dark River designated trout stream (reference (7), reference (8)). In 2004 and

2005, the two years with HBI data for this study, HBI scores ranged from 2.65 (excellent) at the furthest downstream survey location, "Reference Reach", to 6.83 (fairly poor) at "Highway 65 Work" (Large Figure 2). The 2004 and 2005 MNDNR surveys noted that the "Highway 65 Work" site had little to no rock/cobble/gravel substrate, which likely resulted in a less diverse community of macroinvertebrates, and thus a higher HBI score than the other survey sites on the Dark River designated trout stream. Other than the 6.83 score at "Highway 65 Work" and nearby "Highway 65 Control" survey stations, HBI scores for the 2004 and 2005 MNDNR surveys range from good to excellent. Overall, HBI scores for each site within the Dark River designated trout stream are consistent with MNDNR surveys conducted in 1999 and 2000 (reference (12)).

The MPCA also conducted macroinvertebrate surveys in 2008 and calculated HBIs for sites within and downstream of the Dark River designated trout in 2005 stream (reference (9)). The Dark River designated trout stream and Sturgeon River sites had HBI scores of 5.3 and 5.4, respectively, which indicates good water quality. Based on the HBI score the Dark River designated trout stream water quality is similar to or better than other cold water streams within the Little Fork River Watershed. Water quality indicated by HBI scores for other cold water streams within the Little Fork River Watershed ranged from fair to good. These data are consistent with HBI scores from the MNDNR surveys.

GEI Consultants' macroinvertebrate surveys on the Dark River within and downstream of the Dark River designated trout stream were used to calculate HBI scores. The Dark River designated trout stream had a HBI score of 4.71, indicating good water quality while the Dark River downstream of the Dark River designated trout stream had a HBI score of 6.03, indicating fair water quality. HBI scores from GEI Consultants' surveys are consistent with scores from MNDNR and MPCA surveys. HBI scores for the Dark River designated trout stream, Sturgeon River downstream of the Dark River designated trout stream, and other cold water streams are included in Large Table 2.

#### **5.1.2.2 M-IBI and Macroinvertebrate Biocriterion**

The MPCA conducted macroinvertebrate surveys within the Little Fork River Watershed (reference (5)) to determine the Macroinvertebrate Index of Biological Integrity (M-IBI), a metric used to determine the health of the macroinvertebrate community, similar to the F-IBI for fish communities. The WMAR published M-IBI scores for surveyed sites within the report, however; the MPCA's website provides additional data for the macroinvertebrate surveys conducted at each site. The data collected for the Little Fork River Watershed WMAR are also compared to the macroinvertebrate assemblage biocriterion that replaced the M-IBI criterion following promulgation of the TALU rules in 2017.

A summary of the other cold water streams surveyed within the Little Fork River Watershed is also included in Large Table 2 to provide context for typical M-IBI scores in the region near the Dark River designated trout stream. Of the nine cold water stream stations scored using the M-IBI for the Little Fork River Watershed, the Dark River designated trout stream was one of two water bodies to surpass the respective threshold for each M-IBI assessment. Of the nine surveyed cold water stream stations, the Dark River designated trout stream station was one of five stations to exceed the TALU macroinvertebrate assemblage biocriterion (Large Table 2).

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GEI Consultants calculated M-IBI scores for macroinvertebrate surveys conducted within and downstream of the Dark River designated trout stream. Scores for both survey sites exceed TALU macroinvertebrate biocriterion and are included in Large Table 2.

### **5.1.2.3 Macroinvertebrate Summary**

Macroinvertebrate metrics indicate the Dark River designated trout stream meets or exceeds biological indices. Survey data from over a decade consistently indicate that the water quality and habitat of the Dark River designated trout stream support a healthy and diverse community of macroinvertebrates.

### **5.1.3 Habitat**

This section describes habitat surveys conducted in reaches within and downstream of the Dark River designated trout stream as well as in other cold water streams within the Little Fork River Watershed. Habitat monitoring reference sources in this section include data from surveys completed by the MNDNR (reference (7), reference (8)); for the Minntac Water Inventory Reduction Environmental Impact Statement (EIS) (reference (3)), the MPCA's intensive Little Fork River Watershed Monitoring and Assessment Report (WMAR) (reference (5)); the MPCA watersheds web database (reference (9)), and Minntac's 2017 Biological Survey Report (reference (2)). Groundwater inputs, vegetation, woody structures, and physical streambed characteristic, and MPCA Stream Habitat Assessment (MSHA) are used to evaluate the habitat of the Dark River designated trout stream.

#### **5.1.3.1 Groundwater Inputs**

The Dark River designated trout stream includes lowered stream temperatures below Dark Lake due to the cold-water inputs from several tributaries and groundwater springs (reference (3)). After this point, the Dark River is a gaining stream, whereby groundwater contributes to the water quality and flow of the Dark River rather than the Dark River contributing to the water quality and quantity of groundwater. The river begins to receive groundwater inputs near County Road 65 (Large Figure 2). Downstream of Dark Lake, the gradient of the riverbed increases and substrate changes to rock, cobble, and sand providing habitat for self-sustaining populations of trout. Comparatively, upstream of Dark Lake, the upper Dark River is a warm water stream with substrate that is comprised predominately of muck and sand with silt, gravel, and rubble (reference (3)); these characteristics are not suitable trout habitat. Table 5-2 includes a summary of the Dark River's groundwater and surface water interaction and broad habitat characteristics (reference (3)).

**Table 5-2 Dark River Groundwater Characteristics**

Location	Designated Trout Stream?	Description
Minntac SD001 to Dark Lake	No	Lotic - headwaters; upstream of groundwater inputs
Dark Lake to Co. Road 65	Yes	Lotic - upstream of groundwater inputs
Co. Road 65 to Co. Road 688	Yes <sup>(1)</sup>	Lotic - receives groundwater inputs
Co. Road 688 to Sturgeon River confluence	No	Lotic - receives groundwater inputs

(1) Downstream half of this identified segment is designated trout stream.

### 5.1.3.2 Vegetation, Woody Structures, and Physical Streambed Characteristics

MNDNR completed habitat assessments within the Dark River designated trout stream as part of the fish and macroinvertebrate surveys (reference (7), reference (8)) in 2004. In the 2004 surveys, the MNDNR noted the furthest upstream surveyed reach of the Dark River designated trout stream (Highway 65 Control) had moderate amounts of cover over water at least 0.3 meters deep (identified as “deep overhang”). The furthest downstream surveyed reach located near the downstream terminus of the Dark River designated trout stream (Reference Reach) had the most overhead cover and large woody debris (>3 cm in diameter and 50 cm in length). Both stations had at least three habitat types within the reach. Table 5-3 provides a summary of the habitat survey for the MNDNR survey locations on the Dark River designated trout stream. Monitoring locations for the habitat surveys are included in Large Figure 2.

**Table 5-3 MNDNR Habitat Surveys on the Dark River Designated Trout Stream**

Site	Deep Overhang (m)	Large Woody Structures (LWS) m <sup>3</sup>	% Overhang Vegetation	% LWS	% Undercut	% Boulder	% Flat	% Steep
Highway 65 Control <sup>(1)</sup>	13.4	3.6	27.6	27.6	0.0	0.0	44.8	0.0
Highway 65 Work <sup>(1)</sup>	16.6	0.7	44.8	10.3	3.4	0.0	34.5	3.4
Potlatch 2 Control <sup>(1)</sup>	3.0	0.9	3.4	6.9	17.2	3.4	65.5	0.0
Potlatch 1 Work <sup>(1)</sup>	0.5	0.7	0.0	20.7	13.8	0.0	65.5	0.0
Leander <sup>(1)</sup>	1.2	3.7	17.2	27.6	0.0	0.0	55.2	0.0
Reference Reach <sup>(2)</sup>	22.1	16.9	24.1	17.2	3.4	10.3	44.8	0.0

(1) Groundwater inputs begin near Highway 65 Control

(2) Habitat percentage totals did not sum to 100 in the study

Habitat surveys for monitoring locations within and downstream of the Dark River designated trout stream indicate that the Dark River designated trout stream is capable of supporting healthy and diverse aquatic communities.

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### 5.1.3.3 MSHA

Habitat surveys conducted for the Little Fork River WMAR (reference (5)) between 2005 and 2008 used the MSHA tool (reference (13)). The MSHA survey includes a variety of scoring categories, including land use, riparian zone, instream zone (substrate, embeddedness, cover types and amounts) and channel morphology (depth variability, sinuosity, stability, channel development, velocity). Scores from each category are summed for a total maximum score of 100 points. The study averaged scores from stations visited multiple times and rated each station's score as either "poor", "fair", or "good".

MSHA ratings for the Dark River designated trout stream, Sturgeon River, and other cold water streams within the Little Fork River Watershed (reference (5)) are provided in Table 5-4 and Large Table 2 for comparison. Of the seven cold water reaches surveyed on waterbodies other than the Dark River, five reaches received "good" MSHA scores and two reaches received "fair" MSHA scores. Additionally, Sturgeon River station 05RN059, which is not a cold water stream, but is located downstream of the Dark River received a "fair" MSHA score.

In 2017, GEI Consultants also performed habitat surveys for two sites within and downstream of the Dark River designated trout stream using the MSHA rating system. The Dark River designated trout stream and the Dark River downstream survey locations both received "good" MSHA scores, consistent with the MPCA habitat surveys.

**Table 5-4 MSHA Scores for the Dark River and Cold Water Streams within the Little Fork Watershed**

Survey Location	Land Use Score (0-5)	Riparian Score (0-15)	Substrate Score (0-27)	Fish Cover Score (0-17)	Channel Morphology Score (0-36)	MSHA Score (0-100)	MSHA Rating <sup>(1)</sup>
Dark River Designated Trout Stream, Station 99NF120	5	12	20	12	25	74	Good
Sturgeon River, Downstream of the Dark River, Station 05RN059	4	8	18	11	19	60	Fair
Johnson Creek	5	10	10	13	17	55	Fair
Sand Creek	5	13	18	12	24	72	Good
Venning Creek	5	14	12	14	25	70	Good
Stony Brook, Station 08RN042	5	10	14	9	25	65	Fair
Valley River, Station 08RN037	5	11	16	13	27	72	Good
Valley River, Station 08RN020	5	15	20	13	30	83	Good
Trib. To Valley River	5	11	18	13	23	70	Good
Survey Location	Land Use Score (0-5)	Riparian Score (0-14)	Substrate Score (0-28)	Fish Cover Score (0-18)	Channel Morphology Score (0-35)	MSHA Score (0-100)	MSHA Rating <sup>(1, 2)</sup>
DR05, Dark River Designated Trout Stream	5	12	18	18	29	79	Good
DR06, Dark River Designated Trout Stream	5	11	17	12	25	70	Good

(1) Good ≥ 66, fair 45-65, and poor ≤ 44

(2) The MPCA's MSHA score sheet was revised in April 2014.

#### 5.1.3.4 Habitat Summary

Habitat surveys completed by the MNDNR and MPCA support that the Dark River designated trout stream provides diverse, suitable habitat for aquatic communities. Similarly, the macroinvertebrate and fish survey data from the Dark River designated trout stream indicate the presence of high quality habitat for aquatic communities in the Dark River designated trout stream.

## 5.2 Dark River Designated Trout Stream Flow Data

U. S. Steel conducted supplemental water flow monitoring on quarterly intervals from November 2011 through January 2015 and on monthly intervals from April 2018 through August 2018 at monitoring point

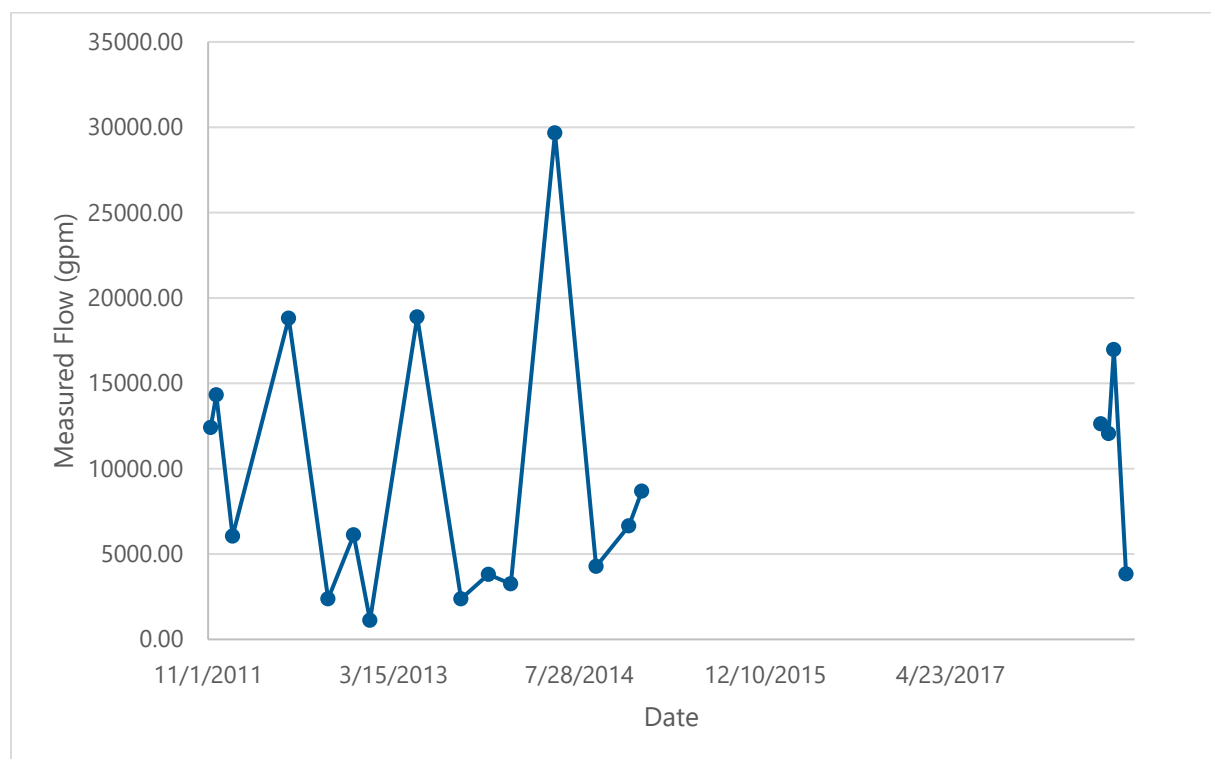
D-1A. Monitoring site D-1A is located where the Dark River and County Road 65 intersect, approximately 1 mile downstream of the start of the Dark River designated trout stream. The D-1A monitoring location is shown on Large Figure 2. D-1A flow includes tailings basin seepage, catchment, and is near where groundwater inputs begin.

Table 5-5 summarizes the results of flow monitoring on the Dark River designated trout stream, and Figure 5-2 provides a graphical representation of these measurements.

**Table 5-5 Dark River Flow Rates**

Feature Name	Monitoring Timeframe	Number of Measurements	Flow Rate (gpm)			
			Minimum	Maximum	Average	Median
Dark River (D-1A) <sup>(1)</sup>	November 2011 through August 2018	19	1,113	29,663	9,698	6,647

(1) D-1A is located at the upstream end of the Dark River designated trout stream. Flow rates could partly be associated with groundwater inputs.



**Figure 5-2 Measured Flow at D-1A**

Table 5-6 shows the monthly average flow for D-1A, as well as the annual average flow. The annual average flow was calculated by averaging the monthly averages.

**Table 5-6 Dark River Designated Trout Stream Average Monthly and Annual Average Flow**

Month	D-1A Average Monthly Flow (gpm)
January	4,772
February	No Data
March	No Data
April	No Data
May	24,275
June	14,497
July	16,970
August	3,833
September	3,007
October	No Data
November	9,164
December	6,647
<b>Annual Average Flow</b>	<b>10,396</b>

The dataset used in this assessment is also available in Appendix B.

### 5.3 Dark River Designated Trout Stream Water Quality

Dark River water quality has been monitored periodically by U. S. Steel at D-1A (Large Figure 2). The monitoring data are summarized in this section for the purpose of providing information on Dark River designated trout stream water quality as compared to water quality standards and comparing Dark River water quality data to cold water parameters critical for trout fish communities.

#### 5.3.1 Comparison to Water Quality Standards

Dark River water quality data have been periodically collected at D-1A. Water quality data and applicable water quality standards are included in Large Table 3.

At monitoring point D-1A, there have been exceedances of the Class 3B hardness standard (250 mg/L), the Class 4A specific conductance standard (1,000  $\mu$ mhos/cm), the Class 1B sulfate standard (250 mg/L), the Class 1B total dissolved solids standard (500 mg/L), the Class 4A total dissolved solids standard (700 mg/L), and the Class 1B aluminum standard (50 to 200  $\mu$ g/L).

Simple statistics were reviewed for D-1A on the Dark River designated trout stream. These results are provided for the Class 1B, 3B, and 4A parameters in Table 5-7. Data used in these calculations for D-1A

(collected quarterly between November 2011 and January 2015 and monthly beginning April 2018) are provided in Appendix B.

Hardness, bicarbonates, total dissolved solids, specific conductance, sulfate, and aluminum had exceedance(s) of water quality standards; however, they are associated with the Dark River designated trout stream designated uses that are neither existing nor attainable, and are being requested for removal. Therefore, these exceedances are not relevant, as these parameters do not affect the remaining uses. Other water quality parameters for the uses requested to be removed do not exceed water quality standards at D-1A, and thus are reasonably not expected to exceed water quality standards as a result of tailings basin surface seepage downstream of D-1A.

**Table 5-7 Statistics for Water Quality Parameters with Result(s) above Water Quality Standards at D-1A**

Factor	Parameter						
	Hardness <sup>(1)</sup>	Bicarbonates	Total Dissolved Solids		Specific Conductance	Sulfate <sup>(2)</sup>	Aluminum <sup>(3)</sup>
Number of Samples	19	19	19		23	19	1
Average	523 mg/L	217 mg/L	678 mg/L		977 μmhos/cm	290 mg/L	85.5 μg/L
Standard Deviation	181	68	223		294	113	N/A
Coefficient of Variation	0.34	0.32	0.33		0.30	0.39	N/A
Maximum Observed Concentration	788 mg/L	312 mg/L	1,040 mg/L		1,412 μmhos/cm	489 mg/L	85.5 μg/L
Class	3B	4A	1B	4A	4A	1B	1B
Water Quality Standard	250 mg/L	305 mg/L	500 mg/L	700 mg/L	1,000 μmhos/cm	250 mg/L	50 μg/L

(1) Downstream of the Dark River designated trout stream the Class 3B designated use changes to the Class 3C designated use. The Class 3C associated water quality standard for hardness is 500 mg/L.

(2) In addition to the Class 1B sulfate water quality standard of 250 mg/L there is a Class 4A sulfate water quality standard of 10 mg/L that is applicable to water used for production of wild rice during periods when the rice may be susceptible to damage by high sulfate levels. As discussed in Section 6.4.2, wild rice is not present on the Dark River designated trout stream.

(3) In addition to the Class 1B water quality standard, there is an aluminum water quality standard for Class 2A. Average and maximum observed aluminum concentrations meet the Class 2A water quality standard.

### 5.3.2 Critical Parameters for Cold Water Fisheries

This section includes a summary of the water quality parameters identified as being critical to cold water fisheries. These critical parameters for cold water fisheries are then compared to Class 1B, 3B, and 4A water quality standards, as well as Class 2A water quality standards. The purpose of the comparison is to determine whether the water quality standards associated the designated uses requested for removal

(Class 1B, 3B, and 4A) are necessary to protect a cold water fishery and whether the remaining Class 2A water quality standards are sufficient to protect a cold water fishery. The parameters identified as being critical to cold water fisheries have been identified and compared to other jurisdictions. The following sources have been considered in this assessment of parameters critical to cold water fisheries:

- literature of water quality necessary to maintain a healthy trout population;
- the Minnesota Class 2A water quality standards (Minnesota Rules, part 7050.022, subpart 2);
- USEPA aquatic life criteria (reference (14)) ; and
- nearby jurisdictions' water quality standards used to protect cold water fisheries, including:
  - Wisconsin (Wis. Adm. Rules Ch. NR 102, 104, and 105),
  - Iowa (IA Adm. Code Chapter 61),
  - South Dakota (ARSD 74:51:01:45 and 74:51:01:55), and
  - Illinois (Ill. Adm. Code Sections 302 and 303).

The intent of including a summary of critical parameters for trout is to demonstrate that these parameters are not addressed in the Class 1B, 3B, or 4A water quality standards and that the designated uses and associated water quality standards that would remain for the Dark River designated trout stream are sufficient for providing a "higher degree of natural protection". This assessment shows that the Class 2A water quality standards include critical criteria necessary for the protection of trout and associated habitat that are not included in the Class 1B, 3B, or 4A water quality standards, including un-ionized ammonia, temperature, DO, pH, total suspended solids (TSS), total residual chlorine (TRC), and free cyanide. These criteria, particularly DO, pH, and temperature, are imperative for cold water fisheries and meet or exceed recommendations for habitat requirements necessary for salmonids (reference (15)). It is important to note that parameters that have exceeded water quality standards in the Dark River designated trout stream, including hardness, bicarbonates, total dissolved solids, specific conductance, and sulfate were not identified as critical parameters for cold water fisheries.

- **Un-ionized ammonia:** Substantial data and research on the toxicity of nitrogenous compounds to aquatic organisms show that the un-ionized fraction is the best indicator of toxicity (reference (16)). For example, a published study (reference (17)) specific to rainbow trout (*Oncorhynchus mykiss*) showed that the lowest observed effect concentration in a five year chronic study is 0.04 mg/L of un-ionized ammonia.
  - Each jurisdiction queried in this review of water quality protective of cold water fisheries has adopted an un-ionized ammonia water quality standard. The Minnesota Class 2A un-ionized ammonia standard is similar to other jurisdictions' water quality standards.
  - The Class 1B, 3B, and 4A uses do not have un-ionized ammonia water quality standards.

- **Temperature:** Temperature is another critical factor in determining the success of trout streams. Brook trout, which are one of the main trout species in the Dark River, are particularly sensitive to temperature (reference (18)).
  - Each jurisdiction includes either a narrative or numeric water quality standard for the protection of cold water communities. Similarly, the Class 2A use prohibits an increase in temperature.
  - The Class 1B, 3B, and 4A uses do not have narrative or numeric temperature standards.
- **Total suspended solids (TSS):** TSS (and turbidity) is another important parameter for the protection of cold water communities, and is a relatively common waterbody impairment in Minnesota (reference (19)). Specifically related to Minnesota, sediment was found to be a greater stressor to cold water fish than warm water fish (reference (18)). Brook trout in turbid water are shown to become more active and switch from drift feeding to active searching. This foraging strategy change is energetically costly and results in lower growth rates for the brook trout (reference (20)).
  - Both Minnesota and South Dakota have adopted TSS water quality standards for cold water fisheries.
  - The Class 1B, 3B, and 4A uses do not have TSS water quality standards.
- **Total Residual Chlorine (TRC):** Chlorination of water is commonly used as a disinfectant in wastewater treatment plants, cooling waters, and in drinking water purification and networks (reference (16)). Although TRC is not expected to be present in detectable amounts in the Dark River designated trout stream, it is necessary to include in standards for the protection of aquatic life. Historical wastewater treatment plant malfunctions, in situ data, and aquatic toxicity data support the importance of a TRC water quality standard. Elevated TRC can result in negative impacts ranging from decreases in trout biomass to mortality (reference (21)).
  - In addition to the USEPA, Minnesota, South Dakota, and Wisconsin have adopted water quality standards for TRC for the protection of aquatic life.
  - The Class 1B, 3B, and 4A uses do not have TRC water quality standards.
- **Free cyanide:** Although free cyanide is not expected to be present in detectable amounts in the Dark River designated trout stream, it is necessary to include in standards for the protection of aquatic life. Cyanide is lethal to freshwater fish at concentrations as low as 50 µg/L with effects apparent as low as 10 µg/L (reference (22)).
  - Cyanide is a USEPA aquatic life water quality standard, and has also been adopted by Illinois and Wisconsin. Similarly, Minnesota Class 2A includes the same water quality standard for free cyanide (5.2 µg/L).

- Because cyanide can be degraded by the human liver to less toxic thiocyanate (reference (22)), the Class 1B domestic consumption use has a much higher free cyanide water quality standard (200 µg/L). This standard is not protective of aquatic life.
  - The Class 3B and 4A uses do not have cyanide water quality standards.
- Dissolved oxygen (DO): Cold water fish, such as trout and salmon, are most affected by low DO levels (reference (23)). USEPA aquatic life criteria identifies the one-day minimum DO level for adult salmonids at 4 mg/L (reference (24)). Salmonids generally avoid areas where DO is less than 5 mg/L and mortality can occur in DO concentrations less than 3 mg/L for more than a couple days (reference (23)).
  - In addition to the USEPA, each jurisdiction has adopted a DO water quality standard for the protection of cold water communities. The Minnesota Class 2A water quality standard is as stringent or more stringent than each jurisdiction.
  - The Minnesota Class 2A DO water quality standard is 7.0 mg/L minimum.
  - The Class 1B, 3B, and 4A uses do not have DO water quality standards.
- **pH:** pH is critical for attenuating the toxicity of many of the compounds referenced in this section. It also can also affect the swimming performance of trout outside of pH range of 6 to 9 Standard Units (S.U.) (reference (25)). Trout avoid areas where pH is outside of the 5.5 to 11 S.U. range.
  - Each jurisdiction has adopted a pH water quality standard range.
  - The Minnesota Class 2A water quality standard is 6.5 to 8.5 S.U.
  - The Class 3B pH water quality standard (6.0 to 9. S.U.) is less stringent than the Class 2A water quality standard.
  - The Class 1B and 4A pH water quality standards (6.0 to 8.5 S.U.) are less stringent than the Class 2A water quality standard.

Water quality data related to the water quality standards critical for cold water trout communities that have been collected on the Dark River are shown in Table 5-8.

**Table 5-8 Water Quality Data Critical for Cold Water Fish Communities and the Dark River Designated Trout Stream**

Parameter	Units	Monitoring Years	Number of Samples	Minimum <sup>(1)</sup>	Maximum <sup>(1)</sup>	Average <sup>(2)</sup>	Applicable Surface Water Quality Standard <sup>(3)</sup>	Number of Class 2A Exceedances
<b>Monitoring Station D-1A<sup>(4)</sup></b>								
pH	SU	November 2011 – April 2018	23	7.36	8.5	7.88	6.5 to 8.5	0
Temperature	°C	November 2011 – April 2018	23	0.0	27.7	10.8	No Material Increase	0
Dissolved Oxygen (DO)	mg/L	November 2011 – April 2018	5	7.77	12.3	10.7	7.0 (as a daily minimum)	0
Nitrogen, Ammonia (unionized)	mg/L	April 2018 – August 2018	7	< 0.010	0.024	0.0077	0.016	1
Free Cyanide	µg/L	April 2018	1	< 16.0	< 16.0	< 16.0	5.2	0
Total Suspended Solids (TSS)	mg/L	April 2018 – August 2018	5	2.4	7.9	5.4	10	0
Total Residual Chlorine (TRC)	µg/L	April 2018	1	< 20	< 20	< 20	11	0

(1) Minimum and maximum determined with non-detect samples at the report limit.

(2) Average calculated with non-detect samples at half the report limit.

(3) The Class 2A (Minnesota Rules, part 7050.0222, subpart 2) surface water quality standard applies to monitoring station D-1A.

(4) D-1A is within the designated trout stream.

This assessment shows that water quality in the Dark River designated trout stream is sufficient for the maintenance of a healthy trout community. Moreover, this assessment shows that Class 2A water quality standards are more stringent and provide more protection for aquatic life than other use designations originally intended to provide a “higher degree of natural protection” (Class 1B and 3B). The Class 4A use also does not include water quality standards more stringent than Class 2A water quality standards.

## 5.4 Downstream Water Quality

As required by 40 CFR 131.10(b) and Minnesota Rules, part 7050.0155, the removal of the Class 1B, 3B, and 4A uses may not prevent the attainment and maintenance of the water quality standards of downstream waters. Evidence showing that water quality standards of downstream waters have been met are included in this section; however, it is important to note that removal of the Class 1B, 3B, and 4A uses

will not result in any changes to water quality from the present state. Section 5.3.1 outlines water quality parameters associated with exceedances of water quality standards. For water quality standards that are not exceeded within the Dark River designated trout stream, monitoring is not required downstream because any exceedances would not be related to this request, the Dark River designated trout stream, or the Minntac tailings basin.

#### 5.4.1 Downstream Water Quality Data

Water quality data have been collected at two points downstream of the Dark River designated trout stream: County Road 688 at Graham Road on the Dark River and County Road 652 at Goodell Road on the Sturgeon River. Water quality data are being collected monthly between May and November 2018. Water quality data collected thus far are summarized in Table 5-9. These data demonstrate the downstream waters currently meet all applicable water quality standards.

**Table 5-9 Summary of Downstream Water Quality Data**

Parameter	Units	Applicable Surface Water Quality Standard		Number of Samples	Number of Exceedances	Minimum	Maximum	Average
County Road 688 at Graham Road (downstream of Dark River designated trout stream)								
Bicarbonate Alkalinity	mg/L	Class 4A	305	4	0	97.2	169	141
Chloride	mg/L	Class 3C	250	4	0	11.1	17.4	15.6
Flow	cfs	N/A		3	N/A	14.21	71.54	42.41
pH	SU	Class 3C	6.0 to 9.0	4	0	7.8	8.21	8.1
		Class 4A	6.0 to 8.5		0			
Specific Conductance	µmhos/cm	Class 4A	1,000	4	0	400	692	572
Sulfate	mg/L	N/A <sup>(1)</sup>		4	4	104	181	154
Total Dissolved Solids	mg/L	Class 4A	700	4	0	268	508	410
Boron	mg/L	Class 4A	0.5	4	0	< 0.1	< 0.15	N/A <sup>(2)</sup>
Calcium	mg/L	N/A		4	N/A	25.5	44.5	37.8
Magnesium	µg/L	N/A		4	N/A	33.3	61.6	50.7
Hardness	mg/L	Class 3C	500	4	0	200.7	364.7	302.8
Potassium	µg/L	N/A		4	N/A	3.0	3.8	3.4
Sodium	%	Class 4A	60% of total cations	4	0	11.2	11.9	11.6

Parameter	Units	Applicable Surface Water Quality Standard		Number of Samples	Number of Exceedances	Minimum	Maximum	Average
County Road 652 at Goodell Road (Sturgeon River)								
Bicarbonate Alkalinity	mg/L	Class 4A	305	5	0	43.3	79.4	63.8
Chloride	mg/L	Class 3C	250	5	0	4.4	6.8	5.9
pH	SU	Class 3C	6.0 to 9.0	5	0	7.5	8.2	7.9
		Class 4A	6.0 to 8.5		0			
Specific Conductance	µmhos/cm	Class 4A	1,000	5	0	132	277	217
Sulfate	mg/L	N/A <sup>(1)</sup>		5	5	23.1	47.6	35.6
Total Dissolved Solids	mg/L	Class 4A	700	5	0	122	192	165
Boron	mg/L	Class 4A	0.5	5	0	< 0.1	< 0.15	N/A <sup>(2)</sup>
Calcium	mg/L	N/A		5	N/A	11.2	20.5	17.5
Magnesium	µg/L	N/A		5	N/A	9.7	18.2	14.6
Hardness	mg/L	Class 3C	500	5	0	67.9	126.1	103.8
Potassium	µg/L	N/A		5	N/A	1.1	1.9	1.44
Sodium	%	Class 4A	60% of total cations	5	0	12.0	14.6	13.3

(1) The Class 4A standard for sulfate is only applicable to water used for production of wild rice during periods when the rice may be susceptible to damage by high sulfate levels per Minnesota Rules, part 7050.0223, subpart 2.

(2) An average was not calculated because all samples were non-detect.

## 6 Assessment of Existence of Designated Uses

This section provides an assessment of the designated uses for the Dark River designated trout stream. The assessment is based on the review of available information referenced in Section 1.3. The designated uses that have been determined to not be existing uses are the Class 1B, Class 3C, and Class 4A uses. The evidence presented in this section fulfills the requirements of Minnesota Rules, part 7050.0405, subpart 1, D. & E. to submit:

*D. the reasons the current use classification is causing harm, unnecessary expense, or other hardship to the petitioner; and E. any additional supporting evidence including, but not limited to, water quality, hydrological, and other relevant data; pictures; testimony of local residents; survey results; and resolutions or actions by local organizations or governmental entities*

The purpose of this assessment is to prove that the Class 1B, 3B, and 4A uses “do not exist or are not attainable” (Minnesota Rules, part 7050.0405, subpart 1).

### 6.1 Domestic Consumption, Class 1B

Class 1B narrative and numeric standards are included in Minnesota Rules, part 7050.0221, subpart 3, which states the following:

*The quality of class 1B waters of the state shall be such that with approved disinfection, such as simple chlorination or its equivalent, the treated water will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the United States Environmental Protection Agency as referenced in subpart 1. The Environmental Protection Agency drinking water standards are adopted and incorporated by reference, except as noted in subpart 1.*

*These standards will ordinarily be restricted to surface and underground waters with a moderately high degree of natural protection and apply to these waters in the untreated state.*

Table 6-1 presents the Class 1B numeric standards included in Minnesota Rules, part 7050.0221, subpart 3, which incorporates by reference the primary (maximum contaminant levels) and secondary drinking water standards issued by the USEPA.

**Table 6-1 Summary of Class 1B Numeric Standards**

Substance, Characteristic, or Pollutant	Maximum Contaminant Level (MCL) or secondary MCL (sMCL)
Alachlor	0.002 mg/L
Alpha particles	15 picocuries per Liter (pCi/L)
Asbestos (fiber > 10 micrometers)	7 million fibers per liter (MFL)
Aluminum	0.05 to 0.2 mg/L
Antimony	0.006 mg/L

Substance, Characteristic, or Pollutant	Maximum Contaminant Level (MCL) or secondary MCL (sMCL)
Arsenic	0.010 mg/L
Atrazine	0.003 mg/L
Barium	2 mg/L
Benzene	0.005 mg/L
Benzo(a)pyrene (PAHs)	0.0002 mg/L
Beryllium	0.004 mg/L
Beta particles and photon emitters	4 millirems/year
Bromate	0.010 mg/L
Cadmium	0.005 mg/L
Carbofuran	0.04 mg/L
Carbon tetrachloride	0.005 mg/L
Chlordane	0.002 mg/L
Chloride	250 mg/L
Chlorite	1.0 mg/L
Chlorobenzene	0.1 mg/L
Chromium (total)	0.1 mg/L
Color	15 color units
Copper	1.0 mg/L
Corrosivity	Non-corrosive
Cyanide (as free cyanide)	0.2 mg/L
2,4-D	0.07 mg/L
Dalapon	0.2 mg/L
1,2-Dibromo-3-chloropropane (DBCP)	0.0002 mg/L
o-Dichlorobenzene	0.6 mg/L
p-Dichlorobenzene	0.075 mg/L
1,2-Dichloroethane	0.005 mg/L
1,1-Dichloroethylene	0.007 mg/L
cis-1,2-Dichloroethylene	0.07 mg/L
trans-1,2-Dichloroethylene	0.1 mg/L
Dichloromethane	0.005 mg/L
1,2-Dichloropropane	0.005 mg/L
Di(2-ethylhexyl) adipate	0.4 mg/L

Substance, Characteristic, or Pollutant	Maximum Contaminant Level (MCL) or secondary MCL (sMCL)
Di(2-ethylhexyl) phthalate	0.006 mg/L
Dinoseb	0.007 mg/L
Dioxin (2,3,7,8-TCDD)	0.00000003 mg/L
<u>Diquat</u>	0.02 mg/L
Endothall	0.1 mg/L
Endrin	0.002 mg/L
Ethylbenzene	0.7 mg/L
Ethylene dibromide	0.00005 mg/L
Fluoride	Primary MCL: 4.0 mg/L
	Secondary MCL: 2.0 mg/L
Foaming agents	0.5 mg/L
Glyphosate	0.7 mg/L
Haloacetic acids (HAA5)	0.060 mg/L
Heptachlor	0.0004 mg/L
Heptachlor epoxide	0.0002 mg/L
Hexachlorobenzene	0.001 mg/L
Hexachlorocyclopentadiene	0.05 mg/L
Iron	0.3 mg/L
Lindane	0.0002 mg/L
Manganese	0.05 mg/L
Mercury (inorganic)	0.002 mg/L
Methoxychlor	0.04 mg/L
Nitrate (measured as Nitrogen)	10 mg/L
Nitrite (measured as Nitrogen)	1 mg/L
Odor	3 TON (threshold odor number)
Oxamyl (Vydate)	0.2 mg/L
pH	6.5 - 8.5
Pentachlorophenol	0.001 mg/L
Picloram	0.5 mg/L
Polychlorinated biphenyls (PCBs)	0.0005 mg/L
Radium 226 and Radium 228 (combined)	5 pCi/L
Selenium	0.05 mg/L

Substance, Characteristic, or Pollutant	Maximum Contaminant Level (MCL) or secondary MCL (sMCL)
Silver	0.1 mg/L
Simazine	0.004 mg/L
Styrene	0.1 mg/L
Sulfate	250 mg/L
Tetrachloroethylene	0.005 mg/L
Thallium	0.002 mg/L
Toluene	1 mg/L
Total Dissolved Solids (TDS)	500 mg/L
Total Trihalomethanes (TTHMs)	0.080 mg/L
Toxaphene	0.003 mg/L
2,4,5-TP (Silvex)	0.05 mg/L
1,2,4-Trichlorobenzene	0.07 mg/L
1,1,1-Trichloroethane	0.2 mg/L
1,1,2-Trichloroethane	0.005 mg/L
Trichloroethylene	0.005 mg/L
Uranium	30 µg/L
Vinyl chloride	0.002 mg/L
Xylenes (total)	10 mg/L
Zinc	5 mg/L

The Class 1 use classification is assigned to waters of the state that serve as a source water for drinking, culinary, food processing, or other domestic purposes. All groundwaters are classified as Class 1, as well as a small subset of surface waters that are protected for drinking water or are designated trout streams. As stated in Minnesota Rules, part 7050.0221, subpart 3, the Class 1B designation is typically used to indicate a degree of natural protection, and in the case of the Dark River, is intended to add protection to the designated trout stream rather than provide for domestic consumption.

U. S. Steel retained Barr Engineering Co. (Barr) to research the historical context behind the reasoning of adopting the Class 1B beneficial use for the protection of trout waters. Barr's research included contacting the MPCA, completing an internet search, and conducting research at the Minnesota Historical Society. A list of the documents examined for this research is included in Appendix C. Barr was unable to find scientific evidence for adoption of the Class 1B use for the protection of trout streams. Furthermore, the researched documentation did not definitively uncover why or when the Class 1B designation was ever applied to designated trout waters. Based on Barr's research at the Minnesota Historical Society, the first classifications for surface waters were proposed in Water Pollution Control rules in the "Proposed

Procedures for Classification of Waters of the State and Adoption of Standards of Quality and Purity" (dated November 2, 1965). Barr's research did not uncover whether the Class 1B use for the purpose of protecting cold water fisheries has been scientifically evaluated or is based on sound science; it is unlikely that such documentation exists.

The MPCA has also recognized the failure to identify the scientific basis behind designating the Class 1B use and the associated water quality standards for the protection of trout waters. The MPCA has identified that the Class 1B designation is a:

*"... hold over from a time [1973] when trout waters were possibly given "special status," including more stringent standards that may not have been based on sound science." (reference (26 p. 122))*

The MPCA has also remarked on the designation of trout streams as being not applicable to the Class 1B beneficial use. In a 2007 Statement of Need and Reasonableness that addressed updates to the list of designated trout waters (reference (26)), the MPCA purported that future rulemaking could focus on removal of the Class 1 use designation for those trout waters, such as the Dark River, that are not actually used for domestic consumption:

*It is worth noting here that all trout waters are protected for domestic consumption (Class 1) regardless of whether or not they are actually used as a community drinking water supply. Thus the EPA drinking water standards apply to all Class 2A waters (Minnesota Rules, part 7050.0420 and 7050.0470) even if the waterbody is not used for drinking. Generally, the Agency believes that the beneficial uses assigned to a waterbody should reflect the actual or potential uses made of that waterbody. The Agency is considering removing the Class 1 use designation for those trout waters not actually used as a drinking water supply in a future rulemaking.*

These statements purporting the non-applicability of the Class 1B designation, the lack of available historical information about the origination of utilizing the Class 1B use to protect trout waters, and the lack of scientific basis for applying Class 1B water quality standards to trout waters show the unreasonableness and unnecessary use of this designation. The research also shows that requiring Class 1B narrative and numeric water quality standards for the purpose of protecting trout is arbitrary and only serves to provide unnecessary expense and hardship for upstream dischargers.

The Dark River designated trout stream was investigated to determine whether the Class 1B domestic consumption use is an existing use on or after November 28, 1975. Public drinking water supply use is investigated in Section 6.1.1; self-supplied domestic consumption is investigated in Section 6.1.2; historical imagery is investigated in Section 6.1.3.

### **6.1.1 Public Drinking Supply**

A review of MNDNR water appropriations permits (reference (27)) was conducted to show whether or not the domestic consumption use exists or has existed since November 28, 1975 for the Dark River designated trout stream. The MNDNR requires a water appropriation permit for users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. The MNDNR water appropriations

database includes water use data collected after 1988; however, permits issued before this date are also included in the database, thus this database provides information on both historical and current uses.

A review of the MNDNR database shows that there are no historical or existing domestic consumption appropriators of surface water from the Dark River designated trout stream for the purpose of using the water for drinking supply. Furthermore, there are no appropriators of surface water for the purpose of domestic consumption within the Little Fork River Watershed. Large Figure 4 shows the locations of surface water appropriations and type of appropriation within and near the Little Fork River Watershed.

In the surrounding communities, public water supplies are not sourced from streams. For example, one of the nearest towns to the Dark River designated trout stream is Kinney, which has two municipal groundwater wells to supply drinking water. The locations of the drinking water groundwater wells are included on Large Figure 5. Large Figure 6 shows areas designated for wellhead protection and the nearby appropriators for public and private domestic consumption. Appendix D includes a table that shows most drinking water is sourced from groundwater wells. Large Figure 7 shows surface drinking water supplies throughout Minnesota, which demonstrates that surface drinking water supplies are limited and not the most common drinking water supply source. It is uncommon for water bodies to have surface water appropriations for drinking water supplies unless they are large lakes, mine pits, or high flow, reliable streams. The Dark River designated trout stream is none of these water body types as demonstrated in Section 5.2.

As identified in this subsection, a public water supply does not exist on the Dark River designated trout stream or within the Dark River Watershed or the Little Fork River Watershed.

### **6.1.2 Self-Supplied Domestic Consumption**

There are a few exemptions to the MNDNR requirement to obtain a water appropriations permit, with the most applicable being the exemption for general residential domestic use purposes that serve less than 25 people. Self-supplied domestic consumption was investigated in support of this UVD to determine whether individuals exempt from obtaining a water appropriations permit have used the Dark River designated trout stream for this purpose. It is important to note that most waterbodies in Minnesota are not designated as Class 1 waters for domestic consumption and that any person could use any surface water for individual drinking water. There are no permits or rules prohibiting this activity. As such, it is unreasonable to designate waters that are not used for permitted domestic consumption or a public water supply. To further this point, the federal Safe Drinking Water Act (SDWA) authorizes the USEPA to set national standards for drinking water. However, the SDWA authorizes that these standards only apply to public water systems (SDWA, Sec. 1401(1)(A)). The SDWA defines a public water system as a system that has “at least fifteen service connections or regularly serves at least twenty-five individuals” (SDWA, Sec. 1401(4)(A)). Because the water quality standards that support the Class 1B domestic consumption use are based on the SDWA primary and secondary drinking water standards, it is reasonable that the Class 1B use should also only apply to public water supplies. There is no need for water quality standards for an unpermitted, self-supplied domestic consumer. Furthermore, it is unreasonable to assume such a use

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when the retention of the Class 1B use causes unnecessary expense and hardship for upstream dischargers.

In addition to self-supplied consumption not being applicable to the Class 1B use, United States Geological Survey (USGS) water use data were queried to also demonstrate that self-supplied consumption is not an existing use of the Dark River designated trout stream. The USGS tracks quantities of water for various specific use categories, including the use category of self-supplied domestic consumption from surface waters and groundwaters. The USGS (reference (28)) estimates that in 2010 in Minnesota, surface water withdrawals for public supply accounted for 1888 million gallons per day of water withdrawal, while self-supplied domestic surface water accounted for 0 gallons per day. In comparison, the USGS (reference (28)) estimates that in 2010 in Minnesota, groundwater withdrawals for public supply were 353 million gallons per day, while self-supplied domestic groundwater accounted for 79 million gallons per day. This shows that if surface waters were to be appropriated for the purpose of domestic consumption it would be through a public water supply since there is no self-supplied consumption of surface water in Minnesota. The relative quantities of surface water and groundwater for consumptive purposes show that in Minnesota, groundwater is a much more common source for domestic consumption use.

As identified in this subsection, self-supplied domestic consumption of surface water is not applicable to the designated Class 1B domestic consumption. Furthermore, self-supplied domestic consumption is not an existing use for the Dark River designated trout stream.

### **6.1.3 Historical Imagery**

A review of aerial photography shows that historically there have not been entities, including municipalities, residents, or places of business that would need to appropriate water for a public water supply. Aerial photography is included in Large Figure 8 through Large Figure 15. Aerial photographs are dated from 1949 (Large Figure 8), 1961 (Large Figure 9), 1972 (Large Figure 10), 1981 (Large Figure 11), 1989 (Large Figure 12), 2003 (Large Figure 13), 2010 (Large Figure 14), and 2017 (Large Figure 15). 40 CFR 131.3(e) defines an existing use as a use that has been attained in the waterbody on or after November 28, 1975; however aerial photographs pre-dating 1975 are included to add context to show that land uses abutting the Dark River designated trout stream have remain relatively unchanged and can be expected to remain relatively unchanged in the future.

As identified in this subsection, historical imagery supports the conclusion that domestic consumption has not occurred on the Dark River designated trout stream.

### **6.1.4 Conclusion**

A review of public water supplies, self-supplied domestic consumption, and historical imagery show that Class 1B domestic consumption use is not an existing use for the Dark River designated trout stream.

## 6.2 Class 2A, Aquatic Life and Recreation

Class 2A numeric standards are included in Minnesota Rules, part 7050.0220, subpart 2, which states the following: *"The quality of class 2A surface waters shall be such as to permit the propagation and maintenance of a healthy community of cold water aquatic biota, and their habitats... These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface waters is also protected as a source of drinking water."*

Table 6-2 includes a summary of Class 2A water quality standards in Minnesota Rules, part 7050.0222, subpart 2. Available data (Large Table 3) show that Class 2A water quality standards are met within the Dark River designated trout stream.

**Table 6-2 Summary of Class 2A Numeric Standards**

Substance, Characteristic, or Pollutant	Class 2A Standard
Ammonia un-ionized as N	16 µg/L
Biochemical Oxygen Demand (BOD5)	1.5 mg/L
Chloride	230 mg/L
Chlorine, total residual (TRC)	11 µg/L
Chlorophyll-a (seston)	7 µg/L
Color Value	30 Pt/Co
Cyanide, free	5.2 µg/L
Diel dissolved oxygen (DO) flux	3.0 mg/L
Dissolved oxygen (DO)	7.0 mg/L (as a daily minimum)
Escherichia (E.) coli	Shall not exceed 126 organisms/100 mL as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms/100 mL. (This standard applies only between April 1 and October 31.)
Oil	500 µg/L
pH	6.5 to 8.5 SU
Phosphorus	50 µg/L
Radioactive Materials	Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as permitted by the appropriate authority having control over their use.
Temperature	No material increase

Substance, Characteristic, or Pollutant	Class 2A Standard
Total Suspended Solids (TSS)	10 mg/L; TSS standard may be exceeded for no more than ten percent of the time. This standard applies only between April 1 and September 30.
Aluminum	87 µg/L
Antimony	5.5 µg/L
Arsenic	2.0 µg/L
Cadmium <sup>(1)</sup>	3.4 µg/L
Chromium, 3+ total <sup>(1)</sup>	644 µg/L
Chromium, 6+ total	11 µg/L
Cobalt	2.8 µg/L
Copper, total <sup>(1)</sup>	23 µg/L
Lead <sup>(1)</sup>	19 µg/L
Mercury, total in water	6.9 ng/L
Mercury, total in edible fish	0.2 mg/kg
Nickel, total <sup>(1)</sup>	297 µg/L
Selenium	5.0 µg/L
Silver <sup>(1)</sup>	0.12 µg/L
Thallium	0.28 µg/L
Zinc <sup>(1)</sup>	343 mg/L
Organic Pollutants	Large Table 3

(1) Class 2A water quality standards for cadmium, chromium +3, copper, lead, nickel, silver, and zinc are hardness dependent. Values listed here for a total hardness of 400 mg/L.

The Class 2A use is automatically applied to waterbodies associated with a higher degree of natural protection, including designated trout streams. Waterbodies that are designated as Class 2A have more stringent water quality standards than the default designation for unlisted waterbodies (Class 2B).

Multiple years of biological data collected by a number of different entities shows that the Class 2A use is an existing use. A description of the aquatic life use in the Dark River designated trout stream is summarized in Section 5.1; these data support that the Class 2A use is an existing use.

### 6.3 Class 3B, Industrial Consumption

Class 3B narrative and numeric standards are included in Minnesota Rules, part 7050.0223, subpart 3, which states the following: *“The quality of class 3B waters of the state shall be such as to permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment.”*

Table 6-3 presents the Class 3B numeric standards included in Minnesota Rules, part 7050.0223, subpart 3.

Table 6-3 includes a summary of Class 3B water quality standards in Minnesota Rules, part 7050.0223, subpart 3. Water quality standards in the Dark River designated trout stream are met with the exception of hardness as described in Section 5.3.1.

**Table 6-3 Summary of Class 3B Numeric Standards**

Substance, Characteristic, or Pollutant	Class 3B Standard
Chlorides (Cl)	100 mg/L
Hardness, Ca + Mg as CaCO <sub>3</sub>	250 mg/L
pH, minimum value	6.0
pH, maximum value	9.0

The Class 3B use is automatically applied to waterbodies associated with a higher degree of natural protection, including designated trout streams. Waterbodies that are designated as Class 3B have more stringent water quality standards than the default designation for unlisted waterbodies (Class 3C). Although the Class 3B designation is intended to protect waterbodies to greater degree than unlisted waters, utilization of such a waterbody for industrial consumption may actually result in harm of these waterbodies resulting in a lesser degree of natural protection (Section 7.3).

The Dark River designated trout stream was investigated to determine whether the Class 3B industrial consumption use is an existing use on or after November 28, 1975. The following subsections present supporting evidence to show that the Class 3B use does not exist based on industrial consumption water appropriation permits (Section 6.3.1) and historical imagery (Section 6.3.2).

### 6.3.1 Industrial Consumption Water Appropriation Permits

A review of water appropriations permits was conducted to prove whether or not the industrial consumption use exists or has existed since November 28, 1975. The review concluded there have been no industrial consumption appropriations from the Dark River designated trout stream since November 28, 1975 (reference (27)). Large Figure 16 and Large Figure 17 show active MNDNR industrial process-related water appropriations permits in Minnesota and St. Louis County, respectively. None of these active permits are for the Dark River designated trout stream or for downstream waters. Appendix E includes a summary of industrial consumption water appropriations permits in Minnesota.

In 1999, MNDNR issued a water appropriations permit to U. S. Steel to withdraw up to 100 million gallons per year of water from the Dark River pond (Permit #99-2063) for road fugitive dust control and miscellaneous mining needs. The use was not for industrial processing, cooling, or other typical industrial needs that are associated with industrial consumption. It is important to note that the Dark River pond is located near the continental divide within the tailings basin feature and was created by U.S. Steel. Unlike Permit #99-2063, typically, water appropriations permits used for the purpose of dust control are not categorized as industrial processing by the MNDNR, but rather as “dust control” under the “special

category". Note that Minntac has coverage under additional water appropriation permits for dust control, which are not included in the industrial processing category. This distinction is reasonable considering the industrial consumption category refers to the protection of water quality to "permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment" and to prevent "fouling, corrosion, scaling, and other unsatisfactory conditions". These narrative uses apply to industrial processing but do not apply to an appropriation for dust control. Despite this, the Dark River pond has not been removed from the dataset since it is not possible to make a similar determination for every water appropriation permit identified as an industrial processing appropriation.

### 6.3.2 Historical Imagery

Aerial photography shows that industrial facilities have not been located along the Dark River designated trout stream and that the general land use of the area has not changed since 1975. Aerial photographs dated after November 28, 1975 support this determination.

Aerial photography is included in Large Figure 8 through Large Figure 15. Aerial photographs are dated from 1949 (Large Figure 8), 1961 (Large Figure 9), 1972 (Large Figure 10), 1981 (Large Figure 11), and 1989 (Large Figure 12), 2003 (Large Figure 13), 2010 (Large Figure 14), and 2017 (Large Figure 15).

40 CFR 131.3(e) defines an existing use as a use that has been attained in the waterbody on or after November 28, 1975; however aerial photographs pre-dating 1975 are included to add context to show that land uses abutting the Dark River designated trout stream have remained relatively unchanged and can be expected to remain relatively unchanged in the future.

### 6.3.3 Conclusion

A review of industrial consumption water appropriations permits and historical imagery show that Class 3B industrial consumption use is not an existing use for the Dark River designated trout stream.

## 6.4 Class 4A, Agricultural Irrigation

Class 4A narrative and numeric standards are included in Minnesota Rules, part 7050.0224. The Class 4A agricultural irrigation beneficial use includes large-scale agricultural irrigation, as well as truck garden crops and wild rice.

Minnesota Rules, part 7050.0224, subpart 1 identifies the applicability of the Class 4A use to wild rice as follows:

*Wild rice is an aquatic plant resource found in certain waters within the state. The harvest and use of grains from this plant serve as a food source for wildlife and humans. In recognition of the ecological importance of this resource, and in conjunction with Minnesota Indian tribes, selected wild rice waters have been specifically identified [WR] and listed in part 7050.0470, subpart 1. The quality of these waters and the aquatic habitat necessary to support the propagation and maintenance of wild rice plant species must not be materially impaired or degraded.*

Minnesota Rules, part 7050.0224, subpart 2 identifies the Class 4A use with respect to agricultural irrigation as follows:

*The quality of class 4A waters of the state shall be such as to permit their use for irrigation without significant damage or adverse effects upon any crops or vegetation usually grown in the waters or area, including truck garden crops.*

Table 6-4 presents the Class 4A numeric standards included in Minnesota Rules, part 7050.0224, subpart 2. These standards are identified such that they “shall be used as a guide in determining the suitability of the waters for such uses, together with the recommendations contained in Handbook 60 published by the Salinity Laboratory of the United States Department of Agriculture, and any revisions, amendments, or supplements to it”. Bicarbonates, TDS, and specific conductance have results that exceed water quality standards as described in Section 5.3.1.

**Table 6-4 Summary of Class 4A Standards**

Substance, Characteristic, or Pollutant	Class 4A Standard
Bicarbonates (HCO <sub>3</sub> )	5 milliequivalents per liter
Boron (B)	0.5 mg/L
pH, minimum value	6.0
pH, maximum value	8.5
Specific conductance	1,000 micromhos per centimeter at 25°C
Total dissolved salts	700 mg/L
Sodium (Na)	60% of total cations as milliequivalents per liter
Sulfates (SO <sub>4</sub> )	10 mg/L, applicable to water used for production of wild rice during periods when the rice may be susceptible to damage by high sulfate levels.
Radioactive materials	Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as prescribed by the appropriate authority having control over their use.

The Dark River designated trout stream was investigated to determine whether the Class 4A agricultural irrigation use is an existing use on or after November 28, 1975. The following subsections present supporting evidence to show that the Class 4A use does not exist based on agricultural irrigation water appropriation permits (Section 6.4.1), lack of wild rice presence (Section 6.4.2), and historical imagery (Section 6.4.3).

#### **6.4.1 Agricultural Irrigation Water Appropriation Permits**

A review of water appropriation permits (reference (27)) was conducted to show whether or not the agricultural irrigation use exists or has existed since November 28, 1975. This review also determined whether any appropriation permits have been granted to users on the Dark River designated trout stream.

This review shows that there are no historical or existing agricultural irrigation appropriators of surface water on the Dark River designated trout stream. Appendix F includes a summary of agricultural irrigation water appropriations permits in Minnesota.

Large Figure 18 shows active surface water and groundwater MNDNR agricultural irrigation water appropriations permits throughout Minnesota. None of these active permits are for the Dark River designated trout stream or for downstream waters. Furthermore, there are no active agricultural irrigation water appropriations in St. Louis County, or nearby Lake County and Cook County.

### 6.4.2 Wild Rice Presence

A review of documentation regarding the presence of wild rice on Minnesota water bodies was conducted to determine the presence of wild rice on the Dark River designated trout stream. Table 6-5 includes a review of reference sources, which demonstrates that no wild rice is present on the Dark River designated trout stream. As a result, the use of the Dark River designated trout stream for wild rice does not exist.

**Table 6-5 Wild Rice Source Evaluation for the Dark River Designated Trout Stream**

Water Body	Associated MPCA WID	Reference Source	Source Indicates Presence of Wild Rice?
Dark River Designated Trout Stream	09030005-525	1854 List <sup>(1)</sup>	No
		Wild Rice Harvester Survey <sup>(2)</sup>	No
		MNDNR 2008 <sup>(3)</sup>	No
		Wild Rice Resource Guide <sup>(4)</sup>	No
		Wild rice waters list in Minnesota Rules, part 7050.0470	No

- (1) 1854 Treaty Authority List of Wild Rice Waters; the 1854 Treaty Authority, an Inter-Tribal Natural Resource Management Organization, conducts surveys on waters within the ceded territory and maintains the wild rice waters list (reference (29))
- (2) 2007 Minnesota DNR Wild Rice Harvester Survey Report; this report summarizes results from the 2006 wild rice harvest season (reference (30)).
- (3) Natural Wild Rice in Minnesota - A Wild Rice Study (reference (31)) was submitted to the Minnesota Legislature in February 2008 by the MDNR. The MPCA included waters listed in this report with wild rice acreage greater than two acres on the draft wild rice waters list. The MPCA included waters without reported acreage, or acreage reported as one acre on the list if additional information was available from other resources listed in (reference (32)).
- (4) 1854 Treaty Authority's Wild Rice Resource Guide provides 2014 list of wild rice water in Minnesota (reference (33)).

In addition to no wild rice presence on the Dark River designated trout stream, the Dark River designated trout stream does not contain habitat that could support wild rice. As described in Section 5.1.3, the habitat indicates habitat for trout, including rocky substrate, groundwater inputs, and pool and riffle morphology. This type of habitat contrasts with the habitat requirements for wild rice. Wild rice requires some moving water with soft, high organic matter substrate and some moving water with flowages, lakes with inlets and outlets and rivers with some moving water being preferred (reference (31)).

### 6.4.3 Historical Imagery

Aerial photography shows that agricultural irrigation has not been located along the Dark River designated trout stream and that the general land use has not changed since 1975. Aerial photographs

dated after November 28, 1975 support this determination. Aerial photographs show that tree farms have existed within the watershed; however, tree farms are not irrigated.

Aerial photography is included in Large Figure 8 through Large Figure 15. Aerial photographs are dated from 1949 (Large Figure 8), 1961 (Large Figure 9), 1972 (Large Figure 10), 1981 (Large Figure 11), and 1989 (Large Figure 12), 2003 (Large Figure 13), 2010 (Large Figure 14), and 2017 (Large Figure 15).

40 CFR 131.3(e) defines an existing use as a use that has been attained in the waterbody on or after November 28, 1975; however aerial photographs pre-dating 1975 are included to add context to show that land uses abutting the Dark River designated trout stream have remained relatively unchanged and can be expected to remain relatively unchanged in the future.

#### 6.4.4 Conclusion

A review of agricultural irrigation water appropriations permits, wild rice presence, and historical imagery show that the Class 4A agricultural irrigation use is not an existing use for the Dark River designated trout stream.

### 6.5 Class 4B, Livestock Watering and Wildlife

Class 4B narrative and numeric standards are included in Minnesota Rules, part 7050.0224. The Class 4B beneficial use applies to both livestock watering and wildlife, such that Minnesota Rules, part 7050.0224, subpart 3 identifies that:

*The quality of class 4B waters of the state shall be such as to permit their use by livestock and wildlife without inhibition or injurious effects.*

Table 6-6 presents the Class 4B numeric standards included in Minnesota Rules, part 7050.0224, subpart 3.

**Table 6-6 Summary of Class 4B Standards**

Substance, Characteristic, or Pollutant	Class 4B Standard
pH, minimum value	6.0
pH, maximum value	9.0
Total salinity	1,000 mg/L
Radioactive materials	Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as prescribed by the appropriate authority having control over their use
Toxic substances	None at levels harmful either directly or indirectly

The Class 4B designated use exists as there are wildlife present throughout the area. Further evaluation of the Class 4B designated use is not applicable to the scope of this document.

## 6.6 Class 5, Aesthetic Enjoyment and Navigation

The Class 5 narrative and numeric standards for aesthetic enjoyment and navigation are included in Minnesota Rules, part 7050.0225. The Class 5 beneficial use:

*... prescribes the qualities or properties of waters of the state that are necessary for the aesthetic enjoyment and navigation designated public uses and benefits. If the standards in this part are exceeded in waters of the state that have the class 5 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.*

Table 6-7 presents the Class 5 numeric standards included in Minnesota Rules, part 7050.0225, subpart 2. Minnesota Rules, part 7050.0225, subpart 2 also states *"The quality of class 5 waters of the state shall be such as to be suitable for aesthetic enjoyment of scenery, to avoid any interference with navigation or damaging effects on property."*

**Table 6-7 Summary of Class 5 Standards**

Substance, Characteristic, or Pollutant	Class 5 Standard
pH, minimum value	6.0
pH, maximum value	9.0
Hydrogen sulfide as S	0.02 mg/L

As a trout fishery and part of the Superior National Forest, the Dark River designated trout stream is used for the purpose of aesthetic enjoyment and navigation. As such, the Class 5 designated use for aesthetic enjoyment and navigation is an existing use. Further evaluation of the Class 5 designated use is not applicable to the scope of this document.

## 6.7 Class 6, Other Uses

The Class 6 narrative and numeric standards for other uses are included in Minnesota Rules, part 7050.0226. The Class 6 beneficial use prescribes *"the qualities or properties of the waters of the state that are necessary for other designated public uses and benefits..."* These uses to be protected may include *"any or all of the uses listed in parts 7050.0221 to 7050.0225, plus any other possible beneficial uses."*

Water quality standards are not numerically specified.

Although no other uses are currently identified for the Class 6 designated use, other uses could be identified in the future. As such, the Class 6 designated use for other uses is an existing use. Further evaluation of the Class 6 designated use is not applicable to the scope of this document.

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## 7 Assessment of Attainability and ‘Use and Value’ of Designated Uses

The Dark River designated trout stream’s designated uses were investigated to determine the use and value of the uses and whether the uses are attainable on the Dark River designated trout stream. Class 1B, 3B, and 4A uses were found to be unattainable.

### 7.1 Class 1B Domestic Consumption

This section demonstrates that the Class 1B designated use is not attainable due to Minnesota Statute and Rule; low flow and natural flow conditions; and population dynamics. Further, the use and value of the Dark River designated trout stream does not support retaining the Class 1B domestic consumption designated use.

#### 7.1.1 Class 1B Use is Unattainable due to Minnesota Statutes and Rules

Minnesota Statute and Rules include provisions that either prohibit or hinder the attainability of the Class 1B use for the Dark River designated trout stream. This section identifies these statutes and rules and their applicability to the Dark River designated trout stream and the Class 1B use.

##### 7.1.1.1 Appropriations Prohibited from Trout Streams

The use of the Dark River designated trout stream as a drinking water source is not attainable due to Minnesota Statutes. The application of the domestic consumption beneficial use (Minnesota Rules, part 7050.0420) for the protection of trout streams, contradicts Minnesota Statutes, section 103G.271, subdivision 5, which states that *“Permits issued after June 3, 1977, to appropriate water from streams designated trout streams by the commissioner’s orders... must be limited to temporary appropriations.”* A domestic consumption or public drinking water supply could not be a temporary appropriation as it would be necessary for this type of water appropriation to be permanent. Temporary appropriations are commonly granted for limited-term activities, such as construction dewatering (which is not a domestic consumption use).

Use of the domestic consumption beneficial use to institute a “high degree of natural protection” is not only outdated, but it directly conflicts with Minnesota Statutes, in part because appropriations would conflict with the goal of protecting the designated trout stream. Because state statute takes precedent over state rules and because Minnesota Rules, part 7050.0420 conflicts with Minnesota Statutes, section 103G.271, subdivision 5, the statute prohibiting appropriation of water from trout streams, necessitates removal of the Class 1B use from the Dark River designated trout stream. It is impossible to permit an appropriation of water from the Dark River designated trout stream for the purpose of domestic consumption without violating Minnesota Statutes, section 103G.271, subdivision 5. Therefore, the Class 1B use is unattainable due to restrictions in existing Minnesota Statutes.

### 7.1.1.2 Land Ownership and Riparian Rights

Landownership and state-specified riparian rights are another common hurdle for the attainability of appropriating water. Beside the fact that appropriating water for domestic consumption from the Dark River designated trout stream is prohibited by Minnesota Statute, another Minnesota Statute limiting riparian rights provides further evidence that the domestic consumption use is unattainable on the Dark River designated trout stream. Per Minnesota Statutes, section 103G.271, subdivision 1. Any applicant for a water use permit must provide evidence of *"ownership, or control of, or a license to use, the land... abutting the surface water source from which water will be appropriated."* Therefore, it is likely that the jurisdiction requiring a water supply would be required to be adjacent to the Dark River designated trout stream. To show whether landownership allows for the appropriation of water in compliance with the Minnesota Statute, landownership abutting the Dark River designated trout stream was determined.

As demonstrated in Section 6.1.2, water appropriated in Minnesota for self-supplied domestic consumers is non-existent and an unreasonable application of the domestic consumption use. Furthermore, a review of the Minnesota Department of Health (MDH) county well index (reference (34)) shows that there are wells on areas adjacent to the Dark River designated trout stream. The locations of wells are also shown in Large Figure 5. There are no towns or jurisdictions adjacent to the Dark River trout stream (Large Figure 6); therefore, it would be infeasible for a town to appropriate water directly from the Dark River designated trout stream, especially since significant distance, numerous wetlands, and different land owners are in between these towns and the Dark River designated trout stream.

As described previously, self-supplied domestic consumption is an inappropriate application of the Class 1B beneficial use; and therefore, the Class 1B domestic consumption use applies to a public water supply. As demonstrated in Section 6.1.1., water appropriations for a public water supply in Minnesota are for 25 persons or more and require a water use permit. There are no parcels abutting the Dark River designated trout stream that have 25 or more persons or an entity that would need to supply a transient population (e.g. an industrial business or commercial space) that would require a public water supply. Therefore, the Class 1B use is unattainable with respect to landownership and riparian rights.

### 7.1.1.3 Alternative Options Must Be Evaluated

Minnesota Rules, part 6115.0660, subpart 3 requires information of a potential appropriator applying for a water use permit. These rules show that an appropriation from the Dark River designated trout stream would not be approved. Minnesota Rules, part 6115.0660, subpart 3(E) requires that applicants must supply a *"Statement of justification supporting the reasonableness and practicality of use with respect to adequacy of the water source, amounts of use, and purposes"* with adequate facts regarding the *"(1) hydrology and hydraulics of the water sources involved, including for surface waters the applicant's analysis of the effect of proposed withdrawals on levels and flows and anticipated impacts..."* In addition, an applicant must supply information on *"(5) alternative sources of water or methods which were considered, to attain the appropriation objective and why the particular alternative proposed in the application was selected."*

Ample alternatives for water sources, including groundwater, are available in the area around the Dark River designated trout stream. The Dark River designated trout stream is designated as such to grant it protection, so disrupting the hydrology and hydraulics of the Dark River designated trout stream would not be approved by the MNDNR when these more appropriate alternative water sources exist. Therefore, the Class 1B use is unattainable with respect to applications for potential appropriations.

## 7.1.2 Class 1B Use is Unattainable due to Low Flow and Natural Conditions

Low flow and natural low flow conditions per 40 CFR 131.10(g)(2) prohibit attainability of the Class 1B use for the Dark River designated trout stream. This section identifies the reasons why these conditions prohibit attainment of the Class 1B use on the Dark River designated trout stream.

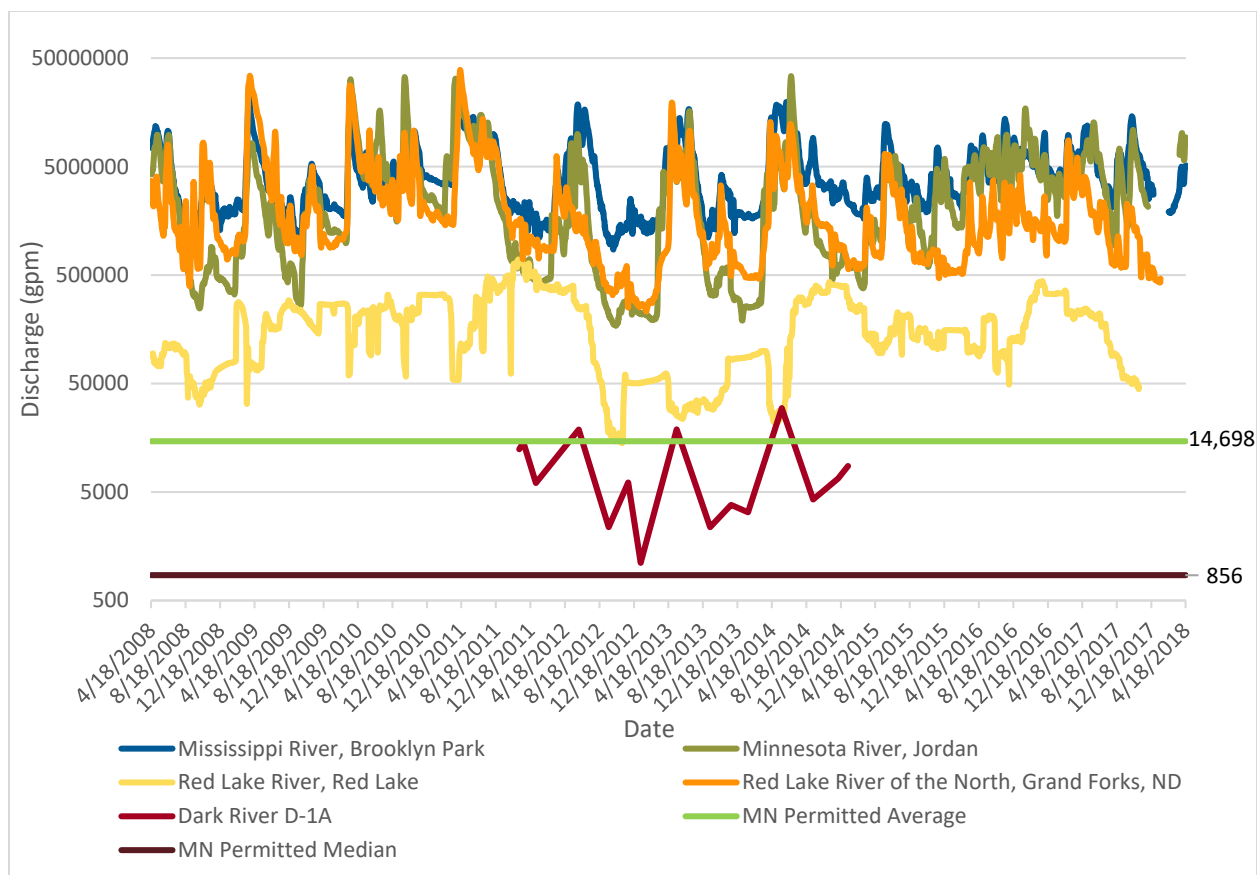
### 7.1.2.1 Public Water Supplies are Sourced from Higher Flow Streams

Table 7-1 provides an overview of water appropriation permits for public water supply (domestic consumption) in Minnesota. Groundwater is the primary domestic consumption source followed by lakes and then streams/ivers.

**Table 7-1 Summary of Water Appropriation Permits for Water Supply Uses in Minnesota**

Resource Type	Total Number of Permits	Permit Status		Permit Total Volume (gpm)			
		Number of Active Permits	Number of Inactive Permits	Minimum	Maximum	Average	Median
Ditch	2	1	1	1,332	1,332	1,332	1,332
Dug Pit/Holding Pond	6	3	3	3.995	237.8	73.02	32.34
Groundwater	5443	2653	2790	0	10,845	1,044	131.5
Lake	86	21	65	0.571	76,104	5,411	257.8
Quarry/Mine	10	5	5	24.73	2,854	938.9	475.6
Stream/River	58	16	42	0	237,823	14,698	856.2
Wetland	2	0	2	No Data	No Data	No Data	No Data

Domestic consumption from streams and rivers are sourced from high-order streams. For example, the streams/ivers with the most water appropriation permits in Minnesota for public water supply are: Mississippi River (12 permits), Red Lake River (9 permits), Minnesota River (4 permits), and Red River of the North (4 permits). In Figure 7-1, the flow rates of these rivers are compared to monitoring point D-1A flow rates. The average (14,698 gpm) and median (856 gpm) total permitted volume of public supply water appropriation permits from rivers/streams in Minnesota are also shown as a comparison. The USGS stations used in Figure 7-1 include 05288500 (Mississippi River at Brooklyn Park), 05330000 (Minnesota River at Jordan), 05074500 (Red Lake River at Red Lake), and 05082500 (Red Lake River of the North in Grand Forks, North Dakota).



**Figure 7-1 The Dark River Designated Trout Stream Compared to Rivers/Streams Flow Rates in the State of Minnesota with the Most Public Water Supply Water Appropriation Permits and Minnesota Average and Median Public Water Supply Appropriations Volumes**

Table 7-1 provides evidence that the large majority of public supply water is appropriated from groundwater (5,443 permits) rather than surface waters (164 permits; with only 58 permits for streams/rivers appropriations). Additionally, Figure 7-1 provides evidence that the waterbodies with the most public supply water appropriation permits in Minnesota have significantly greater flow rates than the Dark River designated trout stream. Flow rates for the Dark River designated trout stream are lower or nearly equal to the average permitted appropriation volume for rivers and streams in Minnesota and not significantly greater than the median permitted appropriation volume for rivers and streams.

Further evidence for the unattainability of the Class 1B use, is the absence of active or inactive public water supply appropriation permits from streams or rivers for the purpose of public drinking water supply in St. Louis County. Rather, as shown in Table 7-2, in St. Louis County public water supply surface water appropriations are sourced most commonly from groundwater followed by lakes and then quarries/mines.

**Table 7-2 Summary of Water Appropriation Permits for Water Supply Uses in in St. Louis County**

Resource Type	Total Number of Permits	Permit Status		Permit Total Volume (gpm)				Resource Names
		Number of Active Permits	Number of Inactive Permits	Minimum	Maximum	Average	Median	
Groundwater	167	100	67	0	1,903	444.2	44.52	--
Lake	22	10	12	3.234	17,123	2,336	523.2	Colby Lake, Lake Superior, Burntside Lake, East Vermilion Lake, St. Mary's Lake
Quarry/Mine	8	6	2	24.73	1,903	699.6	390.0	Canton Mine Pit, Corsica Pit #1, St. James Lake, West Fraser Mine Pit
Stream/River	0	0	0	N/A	N/A	N/A	N/A	N/A

### 7.1.2.2 Dark River Flow Conditions do not Support Domestic Consumption Appropriations

A review of Dark River designated trout stream mean annual natural flow conditions and August flow conditions show that flow conditions are unable to support public water supply appropriations. Methods for this assessment are based on MNDNR guidance (reference (35)) and a literature review (reference (36)) and (reference (37)).

The most specific and applicable guidance is sourced from the MNDNR, in *Report to the Minnesota State Legislature: Definitions and Thresholds for Negative Impacts to Surface Waters*, which provides guidance on thresholds for appropriations from surface waters. This Report recommends “a 10% limit in most circumstances, but recognizes a diversion limit of up to 15% may be appropriate in some areas where water uses are less dependent on a consistent supply” (reference (35)). Additionally, the MNDNR notes that “a 15% diversion limit would preserve much of the seasonal variability, but is not adequate to protect ecosystems during periods of drought.”

Based on applicable precedent in MNDNR recommendations and literature (reference (36)), the MNDNR has shown to restrict appropriations to less than 20% of mean annual flow at natural hydrology (i.e., natural flow conditions) without stream augmentation due to the potential for aquatic life and ecological harm. Natural flow conditions have been used by the MNDNR to assess whether an appropriation is ‘permissible’ without augmentation.

**Table 7-3 Comparison Dark River Designated Trout Stream Flow Conditions and Public Water Supply Appropriations**

Flow Condition	Dark River
	D-1A
Natural Flow Condition as Mean Annual Flow (gpm)	10,396
Current Mean Annual Flow Minus All Seepage (gpm)	7,822
Natural Flow Condition as August Flow (gpm)	3,833
Average Total Permitted Volume of Water Supply Water Appropriation Permits from Streams and Rivers in Minnesota (gpm)	14,698
Average Total Permitted Volume of Water Supply Water Appropriation Permits from Streams and Rivers in Minnesota Compared to Natural Flow Condition as Mean Annual Flow (%)	141
Average Total Permitted Volume of Water Supply Water Appropriation Permits from Streams and Rivers in Minnesota Compared to Natural Flow Condition as August Flow (%)	383

Table 7-3 demonstrates that the average public water supply appropriation is much greater than the mean annual average or August Dark River designated trout stream flow. Based on the use and value of the Dark River designated trout stream, not only is such an appropriation impossible, the aquatic life uses would be harmed from an appropriation of even a small fraction of the average domestic consumption appropriation. This assessment demonstrates that the natural flow conditions prevent attainment of the public drinking water use for these water bodies and that the domestic consumption beneficial use designation is inconsistent with the use and value of the Dark River designated trout stream.

### 7.1.3 Population Dynamics Do Not Warrant Additional Domestic Consumption Water Supplies

Neither the Dark River, nor any other stream/river, is used for domestic consumption water supplies in St. Louis County. Table 7-4 lists the towns within a 10-mile radius of the Dark River designated trout stream, along with the population and current water sources.

U.S. Census population estimates between 2010 and 2016 show that the populations in two of these towns (Cook and Kinney) are declining, and the populations in two other towns (Chisholm and Mountain Iron) are steady (Table 7-4). The population of one of the towns (Buhl) is increasing, but the permitted capacity for the town's water supply is more than adequate to cover a significant population increase. Large Figure 19 and Large Figure 20 show census information near the Dark River designated trout stream and for these nearby jurisdictions.

Therefore, because the current water sources are adequate, it is unlikely that nearby towns will seek the Dark River as an additional source for domestic consumption water supplies. Furthermore, the Dark River is much farther than more reliable water supplies, and due to the abundant presence of wetlands in the

area, building a pipeline from the Dark River to one of these towns would be cost-prohibitive and inconsistent with wetland permitting regulations. Large Figure 21 demonstrates that the distance and number of wetlands between these jurisdictions and the Dark River designated trout stream prohibits attainment of the Class 1B use.

**Table 7-4 Primary Water Sources**

Town	Population <sup>(1)</sup>	Estimated Change in Population from 2010 to 2016 <sup>(1)</sup>	Water Source <sup>(2)</sup>	Type <sup>(2)</sup>	Average Water Usage when Operating, 1988-2016 (gpy) <sup>(3)</sup>	Permitted Capacity (gpy) <sup>(3)</sup>
Buhl	1,000	+11.0%	Well # 238030	Groundwater (Biwabik Iron Formation)	28,802,724	56,400,000
Chisholm	4,897	+0.402%	Fraser-Humphrey Pit	Surface Water (Mine Pit)	171,922,214	250,000,000
Cook	602	-8.36%	Well # 773201	Groundwater (Quat. buried artes. aquifer)	19,626,000	30,000,000
			Well # 773202		20,693,178	30,000,000
Kinney	170	-17.2%	Well # 180274	Groundwater (Biwabik Iron Formation)	7,639,941	16,000,000
Mountain Iron	2,842	+0.349%	Well # 150524	Groundwater (Biwabik Iron Formation)	43,873,879	200,000,000
			Well # 150526		65,131,445	200,000,000

(1) Obtained from US Census 2010 Data

(2) Minnesota Department of Health Source Water Assessments ([https://swareport.web.health.state.mn.us/SWA\\_Default.html](https://swareport.web.health.state.mn.us/SWA_Default.html))

(3) MNDNR Permitting and Reporting System (MPARS) (<https://webapps11.dnr.state.mn.us/mpars/public/authentication/login>)

### 7.1.4 Attainment of Water Quality Standards

Section 5.3.1 and Large Table 3 include a comparison of the Class 1B water quality standards to water quality data collected from the Dark River designated trout stream. The Class 1B water quality standards for aluminum, sulfate, and total dissolved solids have been exceeded in the Dark River designated trout stream. Attainment of these water quality standards for a non-existent and unattainable use is an unnecessary hardship and expense for upstream dischargers and does not support the overall use and value of the water.

### 7.1.5 Conclusion

The Class 1B use is unattainable and does not support the use and value of the Dark River designated trout stream due to the following factors:

- Minnesota Statutes and Rules render the Class 1B domestic consumption designated use unattainable for the Dark River designated trout stream.

- Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.
- Minnesota Statutes, section 103G.271, subdivision 1 hinders potential applicants from obtaining a water use permit due to riparian rights. Riparian landowners adjacent to the Dark River designated trout stream do not require domestic water supplies from a surface water source.
- Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water from the Dark River designated trout stream. A domestic consumption water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical.
- Low flow and natural flow conditions per 40 CFR 131.10(g)(2) *Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements* render the Class 1B domestic consumption designated use unattainable for the Dark River designated trout stream.
  - The average domestic consumption appropriation in Minnesota is greater than the Dark River designated trout stream mean annual flow; such an appropriation is impossible.
  - The average domestic consumption appropriations in Minnesota is greater than the Dark River designated trout stream August flow volume; such an appropriation is impossible.
  - An appropriation for domestic consumption may harm aquatic life uses
- Populations in the vicinity of the Dark River designated trout stream are not increasing and/or current water supplies are sufficient, such that new water supplies do not need to be sought.
  - In the event that new water sources for nearby towns would need to be identified, the Dark River designated trout stream is unsuitable due to its distance from nearby towns and numerous wetlands in between the towns and the stream.

This assessment supports removal of the Class 1B domestic consumption designated use from the Dark River designated trout stream.

## 7.2 Class 2A Aquatic Life

This section demonstrates that because the Class 2A designated use is an existing it is also an attainable use within the Dark River designated trout stream. Further, the use and value of aquatic life within the Dark River designated trout stream does not support retaining the Class 1B, 3B, and 4A designated uses.

### 7.2.1 Attainment of Class 2A Numeric Standards

Attainment of numeric water quality standards indicates that the Class 2A use is an existing and attainable use. There are no measured exceedances of Class 2A numeric standards on the Dark River designated

trout stream. Further information on water quality data are included in Section 5.3.1 and Large Table 3. Water quality downstream of the Dark River designated trout stream is provided in Table 5-9.

Numeric eutrophication standards are addressed in Section 7.2.2.

### 7.2.2 Narrative Standards Show that the Class 2A Use is an Existing Use

Attainment of narrative standards for the Dark River designated trout stream indicates that the Class 2A use is an existing and attainable use. Minnesota Rules, part 7050.0150, subpart 3 outlines narrative standards for all Class 2 waters, for the purpose of determining compliance with water quality, biological and physical conditions, and compliance with standards:

*The aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residue in the waters, sediments, and aquatic flora or fauna; the normal aquatic biota and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of aquatic biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters.*

Minnesota Rules, part 7050.0150, subpart 5 through 7 deconstruct the narrative standards in subpart 3 by providing evaluation methods to determine whether a waterbody is impaired for the narrative standards. The following subsections evaluate the narrative standards included in Minnesota Rules, part 7050.0150 and numeric standards in Minnesota Rules, part 7050.0222. **Bold** text indicates a distinct component of the narrative standards evaluation criteria for which data to support the standard have been collected.

#### 7.2.2.1 Narrative Eutrophication Standards

Narrative eutrophication standards for Class 2A streams and rivers are addressed in Minnesota Rules, part 7050.0222, subpart 2b. Narrative eutrophication standards and measured data for the Dark River designated trout stream are included in Large Table 4. The Dark River designated trout stream eutrophication data are compared to Minnesota Rules, part 7050.0220, subpart 2b, which states:

- A. Eutrophication standards for rivers and streams are compared to summer-average data or as specified in subpart 2. Exceedance of the total phosphorus levels and chlorophyll-a (seston), five-day biochemical oxygen demand (BOD<sub>5</sub>), diel dissolved oxygen flux, or pH levels is required to indicate a polluted condition.**

Dark River designated trout stream measured total phosphorus levels, chlorophyll-a (seston), BOD<sub>5</sub>, diel DO flux, and pH levels, as well as the associated eutrophication standards are included in Large Table 4. Available data indicate that the Class 2A designated use is existing and is attained.

It is also important to note that phosphorus and nitrogen data have been collected from the Minntac Tailings Basin surface seepage at SD001. Data collected in 2014 at SD001 found the total phosphorus

concentration to be 2 µg/L and the total organic nitrogen concentration to be <1.0 mg/L. These data show that phosphorus and nitrogen in the Dark River are not constituents sourced from the Minntac Tailings Basin. Therefore, if elevated phosphorus and nitrogen concentrations are measured in the Dark River designated trout stream they are more likely sourced from downstream activities, which could include leaching septic systems from nearby land owners. Measurements and/or indications of possible elevated nitrogen and phosphorus are not related to Minntac operations or associated with this request to remove the Class 1B, 3B, and 4A uses from the Dark River designated trout stream.

**B. Rivers and streams that exceed the phosphorus levels but do not exceed the chlorophyll-a (seston), five-day biochemical oxygen demand (BOD<sub>5</sub>), diel dissolved oxygen flux, or pH levels meet the eutrophication standard.**

Data collected from the Dark River designated trout stream indicate the phosphorus level is not exceeded. Refer also to Large Table 4.

**C. For chlorophyll-a (periphyton), the standard is exceeded if concentrations exceed 150 mg/m<sup>2</sup> more than one year in ten.**

Data for chlorophyll-a (periphyton) are unavailable for the Dark River designated trout stream. Other available data for narrative standards Minnesota Rules, part 7050.0222, subpart 2b(A) and (B) indicate the Class 2A use is existing and attainable. Because chlorophyll-a (periphyton) is a response variable to nitrogen and phosphorus, it is unnecessary to evaluate this criterion to show that the Class 2A use is existing and in attainment.

### **7.2.2.2 Excess Algae or Plant Growth**

Minnesota Rules, part 7050.0150, subpart 5 includes evaluation criteria or factors to determine use impairment for excess algae or plant growth. Although U. S. Steel is showing that the Class 2A designated use is an existing use and attained for Dark River designated trout stream rather than that there is a use impairment, these factors provide one such evaluation tool to show that the Dark River designated trout stream meets applicable narrative standards. Minnesota Rules, part 7050.0150, subpart 5 includes the following items as factors for consideration:

**A. Representative summer-average concentrations of total phosphorus and total nitrogen measured in the water body;**

The Dark River designated trout stream meets the Class 2A narrative standards for total phosphorus and total nitrogen as shown in Large Table 4.

**B. Representative summer-average concentrations of chlorophyll-a seston measured in the water body;**

The Dark River designated trout stream meets the Class 2A narrative standard for chlorophyll a-seston as shown in Large Table 4.

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**C. Representative summer-average concentrations of Secchi disk transparency measured in the water body**

Secchi disk transparency data are not currently available. Available data for narrative standards Minnesota Rules, part 7050.0222, subpart 5(A) and (B) indicate the Class 2A use is existing and attainable. Because water clarity measured through a secchi disk is a response variable to nitrogen and phosphorus, it is unnecessary to evaluate this criterion to show that the Class 2A use is existing and in attainment.

**D. Representative summer-average concentrations of five-day biochemical oxygen demand measured in rivers and streams;**

The Dark River designated trout stream meets the Class 2A narrative standard for five-day biochemical oxygen demand as shown in Large Table 4.

**E. Representative diel dissolved oxygen flux measurements in rivers and streams as averaged over a minimum of four consecutive days during the summer season;**

The Class 2A standard for diel DO flux is less than or equal to 3.0 mg/L. The summer average diel DO flux for the Dark River designated trout stream is 4.0 mg/L as shown in Large Table 4. The summer average is calculated for mid-July through mid-August, which is often the hottest part of the year and has the potential to result in large temperature changes and thus wide DO variability. A longer collection period may decrease the diel DO flux. Additionally, although the diel DO flux is higher than the Class 2A standard for the north river nutrient region, all other indicators of eutrophication (including nitrogen and phosphorus measurements) show that eutrophication and excess algae and plant growth are not concerns for the Dark River designated trout stream. This is also evidenced by the presence of diverse, abundant fish communities as described in Section 5.1.

**F. Representative measurements of pH in the water body during the summer season;**

The Dark River designated trout stream meets the Class 2A narrative standards for pH as shown in Large Table 4.

**G. Representative measurements of chlorophyll-a (periphyton) on substrates on the beds of rivers and streams during the summer season; and**

Chlorophyll-a (periphyton) data are not currently available. Available data for narrative standards Minnesota Rules, part 7050.0222, subpart 5 indicate the Class 2A use is existing and attainable. Because chlorophyll-a (periphyton) is a response variable to nitrogen and phosphorus, it is unnecessary to evaluate this criterion to show that the Class 2A use is existing and in attainment.

**H. Any other scientifically objective, credible, and supportable factor.**

Section 5.3.1 provides additional Class 2A numeric data in support of Class 2A attainability for the Dark River designated trout stream.

Minnesota Rules, part 7050.0150, subpart 5b outlines criteria for finding of an impaired condition for rivers and streams using the factors in Minnesota Rules, part 7050.0150, subpart 5 above. Although U. S. Steel is showing that the Class 2A designated use is an existing use and attained for Dark River designated trout stream rather than that there is an impaired condition, these factors provide one such evaluation tool to show that the Dark River designated trout stream meets applicable narrative standards. Minnesota Rules, part 7050.0150, subpart 5b includes the following that may be considered in determining whether the Class 2A narrative standards are being attained:

- A. elevated levels of nutrients under subpart 5, item A, and at least one factor showing impaired conditions resulting from nutrient over enrichment under subpart 5, item B, D, E, F, or H; or**
- B. elevated levels of chlorophyll-a (periphyton) under subpart 5, item G.**

Large Table 4 includes the summer-average for data applicable under Minnesota Rules, part 7050.0150, subpart 5, which shows attainment of the numeric and narrative eutrophication standards with the exception of diel DO flux.

### **7.2.2.3 Fish for Human Consumption**

Minnesota Rules, part 7050.0150, subpart 7 provides impairment evaluation criteria for the Minnesota Rules, part 7050.0150 subpart 3 narrative standard relating to fish for human consumption. An evaluation of the criteria shows that the Dark River designated trout stream meets the narrative standards for fish for human consumption. Consistent with Minnesota Rules, part 7050.0150, subpart 7, the following criteria have been considered:

- A. In evaluating whether the narrative standards in subpart 3, which prevent harmful pesticide or other toxic pollutant residues in aquatic flora or fauna, are being met, the commissioner must use the methods in:**
  - (1) parts 7050.0218 and 7050.0219 for site-specific fish tissue-based chronic criterion ( $CC_{ft}$ ); or**
  - (2) parts 7050.0222 and 7052.0100 for fish tissue-based chronic standard ( $CS_{ft}$ ).**

Not applicable; there are no site-specific fish tissue-based chronic criterion or a fish tissue-based chronic standard applicable to the Dark River designated trout stream. Therefore, impairment of the waters due to fish consumption must be considered based on fish consumption frequency recommendations.

- B. If  $CS_{ft}$  has not been established for a pollutant with chronic standards (CS) applicable in water ( $CS_{drf}$ ,  $CS_{dev}$ , or  $CS_{fr}$ , as defined in parts 7050.0218, subpart 3, item Q, and 7050.0219, subpart 13, item B), the residue levels in fish muscle tissue established by the Minnesota Department of Health must be used to identify surface waters supporting fish for which the Minnesota Department of Health recommends a reduced frequency of fish consumption for the protection of public health. A water body will be considered impaired when the**

**recommended consumption frequency is less than one meal per week, such as one meal per month, for any member of the population. That is, a water body will not be considered impaired if the recommended consumption frequency is one meal per week, or any less restrictive recommendation such as two meals per week, for all members of the population. The impaired condition must be supported with measured data on the contaminant levels in the resident fish.**

Many of Minnesota's lakes and streams may include fish consumption guidelines issued by the Minnesota Department of Health (MDH) due to elevated levels of mercury, polychlorinated biphenyls (PCBs), perfluorooctane sulfonate (PFOS), or a combination of the aforementioned pollutants in fish tissue. MDH's Fish Consumption Guidelines were investigated to determine whether the Dark River designated trout stream has been issued such guidelines and whether these guidelines indicate an impairment (reference (38)). MPCA recommends women who are or may become pregnant and children under the age of fifteen to eat no more than one meal per week for all sizes of brook trout and brown trout. For men and women not planning to be pregnant, there are no restrictions on the amount of fish from the Dark River. Therefore, the Dark River designated trout stream meets the Class 2A narrative standard and the Class 2A use is existing and attained with respect to fish for human consumption.

- C. When making impairment determinations in an individual water body for a pollutant with both a fish tissue-based  $CC_{ft}$  or  $CS_{ft}$  and a CS applicable in water, comparison of fish tissue data to the  $CC_{ft}$  or  $CS_{ft}$  must be the basis for the final impairment determination.**

Not applicable, there are no site-specific fish tissue-based chronic criterion or a fish tissue-based chronic standard applicable to the Dark River designated trout stream.

#### **7.2.2.4 Biological Community and Aquatic Habitat**

Minnesota Rules, part 7050.0150, subpart 6 provides impairment evaluation criteria for the Minnesota Rules, part 7050.0150 subpart 3 narrative standard relating to biological community and aquatic habitat. An evaluation of the criteria shows that the Dark River designated trout stream meets narrative standards and the Class 2A use is existing and attained with respect to biological community and aquatic habitat.

Minnesota Rules, part 7050.0150, subpart 6 considers the following factors related to the biological community and aquatic habitat:

***A finding of an impaired condition must be supported by data for the factors listed in at least one of items A to C. The biological quality of any given surface water body will be assessed by comparison to the biological conditions determined by the commissioner using a biological condition gradient model or a set of reference water bodies which best represents the most natural condition for that surface water body type within a geographic region.***

- A. an index of biological integrity calculated from measurements of attributes of the resident fish community, including measurements of:**

- a. species diversity and composition;**
- b. feeding and reproduction characteristics; and**
- c. fish abundance and condition;**

Biological integrity indices show that the Dark River designated trout stream meets or exceeds the established fish thresholds and biocriterion for similar waterbodies. F-IBI scores are included in Section 5.1.1 and Large Table 2. Data show that the Class 2A designated use, with respect to narrative conditions for the fish community, is existing and attained in the Dark River designated trout stream.

**B. an index of biological integrity calculated from measurements of attributes of the resident aquatic invertebrate community, including measurements of:**

- a. species diversity and composition;**
- b. feeding characteristics; and**
- c. species abundance and condition;**

Biological integrity indices show that the Dark River designated trout stream meets or exceeds the established macroinvertebrate thresholds and biocriterion for similar waterbodies. M-IBI scores are included in Section 5.1.2 and Large Table 2. Data show that the Class 2A designated use, with respect to narrative conditions for the aquatic invertebrate community, is existing and attained in the Dark River designated trout stream.

**C. an index of biological integrity calculated from measurements of attributes of the resident aquatic plant community, including measurements of:**

- a. species diversity and composition, including algae; and**
- b. species abundance and condition**

Data are currently unavailable for the aquatic plant community; however, because the goal is to show that the Class 2A use is existing and attainable rather than impaired this information is unnecessary to make such a demonstration. Aquatic plant communities likely support fish and macroinvertebrate uses. Surveys completed by the MNDNR and MPCA make no note of the lack of biological integrity in the resident plant community.

**D. a quantitative or qualitative assessment of habitat quality, determined by an assessment of:**

- a. stream morphological features that provide spawning, nursery, and refuge areas for fish and invertebrates;**
- b. bottom substrate size and variety;**

- c. **variations in water depth;**
- d. **sinuosity of the stream course;**
- e. **physical or hydrological alterations of the stream bed including excessive sedimentation;**
- f. **types of land use in the watershed; and**
- g. **other scientifically accepted and valid factors of habitat quality; and**

There is no impairment to the habitat quality, as indicated by MSHA scores collected by the MPCA and GEI Consultants (refer also to Section 5.1.3). MSHA criteria specifically address Minnesota Rules, part 7050.0150, subpart 6.D. by evaluating the following:

- land use;
- riparian zone, including width, bank erosion, and shade;
- instream zone, including substrate, embeddedness, siltation, and cover types and amounts;
- channel morphology, including depth variability, channel stability, velocities, sinuosity, and modifications; and
- aquatic vegetation.

Data show that the Class 2A designated use, with respect to narrative conditions for habitat quality, is existing and attained in the Dark River designated trout stream.

**E. any other scientifically objective, credible, and supportable factors.**

Biological, flow, and water quality data also support that the Class 2A designated use is existing and attainable. These data are provided in Section 5.

#### **7.2.2.5 Class 2Ag – General Cold Water Aquatic Life and Habitat**

Minnesota Rules, part 7050.0222, subpart 2d provides biological criteria for lotic cold water aquatic life and habitats for Class 2A waters established in 2017 under the MPCA's TALU framework. The Dark River designated trout stream is considered a "Class 2Ag" water, which, according to Minnesota Rules, part 7050.0222, subpart 2c is defined as:

*A beneficial use that means waters capable of supporting and maintaining a balanced, integrated, adaptive community of cold water aquatic organisms having a species composition, diversity, and functional organization...*

subpart 2d lists the biocriterion for Class 2Ag waters, which are measured using the references listed in subpart 2c. Large Table 2 provides a comparison of Dark River designated trout stream F-IBI and M-IBI scores to the biocriterion standards in Minnesota Rules, part 7050.0222, subpart 2d. At the MPCA and

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Minntac monitoring stations, data meet TALU biocriterion with the exception of the F-IBI score for the MPCA station sampled in August 2008, which falls a point short of the 2Ag biocriterion. Based on these data, the Dark River designated trout stream meets the Class 2Ag applicable biocriterion and attains the Class 2Ag beneficial use.

### 7.2.3 Conclusion

The Class 2A use is attainable and supports the use and value of the Dark River designated trout stream due to the following factors:

- Class 2 water quality standards are met in the Dark River designated trout stream.
- The narrative eutrophication standards in Minn. R, 7050.0220, subpart 2b are met and do not indicate a polluted condition.
- The Class 2A use narrative standard in Minnesota Rules, part 7050.0150, subpart 3 is met based on existing and available data for the Dark River designated trout stream.
  - The only eutrophication standard that is not met is diel DO flux for the northern nutrient region. This is based off of data collected in 2018 from mid-July through mid-August.
  - The biological community and aquatic habitat criteria are met based on Minnesota Rules, part 7050.0150, subpart 6.
  - The fish for human consumption criteria are met based on Minnesota Rules, part 7050.0150, subpart 7 criteria.
- With the except of the June 2008 F-IBI score, which is one point below the biocriterion, F-IBI and M-IBI scores for the Dark River designated trout stream meet or exceed the Class 2Ag biocriterion thresholds.

This assessment supports attainment of the Class 2A aquatic life designated use on the Dark River designated trout stream.

## 7.3 Class 3B Industrial Consumption

This section demonstrates that the Class 3B designated use is not attainable due to Minnesota Statute and Rule and low flow and natural flow conditions. Further, the use and value of the Dark River designated trout stream does not support retaining the Class 3B industrial consumption designated use.

### 7.3.1 Class 3B Use is Unattainable due to Minnesota Statutes and Rules

Minnesota Statutes and Rules include provisions that either prohibit or hinder the attainability of the Class 3B use for the Dark River designated trout stream. This section identifies these statutes and rules and their applicability to the Dark River designated trout stream and the Class 3B use. A further discussion on the statutes and rules that prohibit, hinder, or limit appropriations from the Dark River designated trout stream are included in Section 7.1.1.

### 7.3.1.1 Appropriations Prohibited from Trout Streams

The application of the industrial consumption Class 3B beneficial use (Minnesota Rules, part 7050.0420) for the protection the Dark River trout stream, contradicts Minnesota Statutes, section 103G.285, subdivision 5, which states that *"Permits issued after June 3, 1977, to appropriate water from streams designated trout streams by the commissioner's orders ... must be limited to temporary appropriations."* Industrial appropriations are not temporary, as shown through a review of the industrial processing category in the MNDNR database (reference (27)). Further discussion on Minnesota Statutes, section 103G.285, subdivision 5 is also included in Section 7.1.1.1 as it pertains to the Class 1B designated use.

### 7.3.1.2 Consumptive Appropriations Limited During Periods of Low Flows

Minnesota Statutes, section 103G. 285, subdivision 2 requires that *"permits to appropriate water from natural...watercourses must be limited so that consumptive appropriations are not made from watercourses during periods of specified low flows."* The statute identifies that the purpose is to *"safeguard water availability for in-stream uses and for downstream higher priority users located reasonably near the site of appropriation."*

Low flow conditions occur in mid-winter and mid- to late- summer when water availability for aquatic life uses and other potential beneficial uses is already scarce. Industrial consumptive use would require appropriations during this time because industrial operations are not seasonally limited appropriators. Such an appropriation would not safeguard water availability for in-stream uses.

### 7.3.1.3 Alternative Options Must Be Evaluated

Minn. Stat 103G.301, subdivision 1 requires that an application must take into account *"alternatives to the actions proposed in the permit application, including conservation measures to improve water use efficiencies and reduce water demand"* and *"anticipated changes in water and related land resources."*

Similarly, Minnesota Rules, part 6115.0660, subpart 3 requires information of a potential appropriator applying for an industrial consumption appropriation permit. These rules show that an appropriation from the Dark River designated trout stream would not be approved. Minnesota Rules, part 6115.0660, subpart 3(E) requires that applicants must supply a *"Statement of justification supporting the reasonableness and practicality of use with respect to adequacy of the water source, amounts of use, and purposes"* with adequate facts regarding the *"(1) hydrology and hydraulics of the water sources involved, including for surface waters the applicant's analysis of the effect of proposed withdrawals on levels and flows and anticipated impacts..."* In addition, an applicant must supply information on *"(5) alternative sources of water or methods which were considered, to attain the appropriation objective and why the particular alternative proposed in the application was selected."*

The potential appropriator would have to consider other water source options in order to gather approval, which would show that an appropriation is not consistent with Minnesota Statutes, not necessary, and not an appropriate use of the Dark River designated trout stream. Groundwater appropriations instead of surface water appropriations allow an appropriator to have reliable flow, the ability to appropriate

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adequate volume for industrial uses, the ability to allocate water without causing ecological harm, and does not jeopardize the Class 2A aquatic life beneficial use. It is also reasonable to assume that a water appropriations permit from the Dark River designated trout stream would not be approved by the MNDNR because groundwater is a preferred alternative.

### **7.3.2 Class 3B Use is Unattainable due to Low Flow and Natural Conditions**

The Class 3B industrial consumption use is not attainable due to natural and low flow conditions.

“Natural,” “intermittent,” and “low flow conditions” [40 CFR 131.10(g)(2)] prevent attainment of the Class 3B use. This section provides evidence that natural flow conditions render the industrial consumption use infeasible (40 CFR 131.10(g)(2)) for the Dark River designated trout stream.

Table 7-5 provides a summary and comparison of the Dark River designated trout stream’s flow conditions. The mean annual natural flow shows that flow conditions are unable to support industrial consumption appropriations based on MNDNR guidance (reference (35)) and literature reviews (reference (36)). The MNDNR recommends “a 10% limit in most circumstances, but recognizes a diversion limit of up to 15% may be appropriate in some areas where water uses are less dependent on a consistent supply” (reference (35)). MNDNR found that a diversion limit of no more than 10% of the August median base flow is required to preserve the seasonal variability of the natural hydrology under all but extreme drought conditions. Based on applicable precedent in MNDNR recommendations and literature (reference (36)), the MNDNR has shown to restrict appropriations to less than 20% of mean annual flow at natural hydrology (i.e., natural flow conditions) without stream augmentation due to the potential for aquatic life and ecological harm.

Based on these criteria, natural flow conditions prevent attainment of the industrial consumption use.

**Table 7-5 Comparison of Dark River Designated Trout Stream Flow Conditions and Industrial Appropriations**

Flow Condition	Dark River Designated Trout Stream
	D-1A
Natural Flow Condition as Mean Annual Flow (gpm)	10,396
Current Mean Annual Flow Minus All Seepage (gpm)	7,822
Natural Flow Condition as August Flow (gpm)	3,833
Average Total Permitted Volume of Industrial Processing Water Appropriation Permits (gpm)	1,964
Average Total Permitted Volume of Industrial Processing Water Appropriation Permits Compared to Natural Flow Condition as Mean Annual Flow (%)	18.9
Average Total Permitted Volume of Industrial Processing Water Appropriation Permits Compared to Natural Flow Condition as August Flow (%)	51.2

Industrial consumption appropriators must have reliable and consistent flow in order to ensure industrial operations can continue to operate and be profitable. Low flow conditions on the Dark River designated trout stream are intermittent and typically occur during mid-winter and late-summer, meaning that an industrial appropriator would be unable to operate part of the year. Table 7-6 provides a summary of the monthly average for natural flow conditions for D-1A.

A hypothetical industrial appropriator would not be bound by these low flow conditions if they appropriated from groundwater. Groundwater appropriations are limited to not inducing negative impacts, including negative impacts to surface waters (reference (35)). The quantity of appropriation from groundwater for negative impacts to occur is conceivably much higher than that for surface waters.

**Table 7-6 Dark River Designated Trout Stream Monthly Average Flows for Natural Flow Conditions**

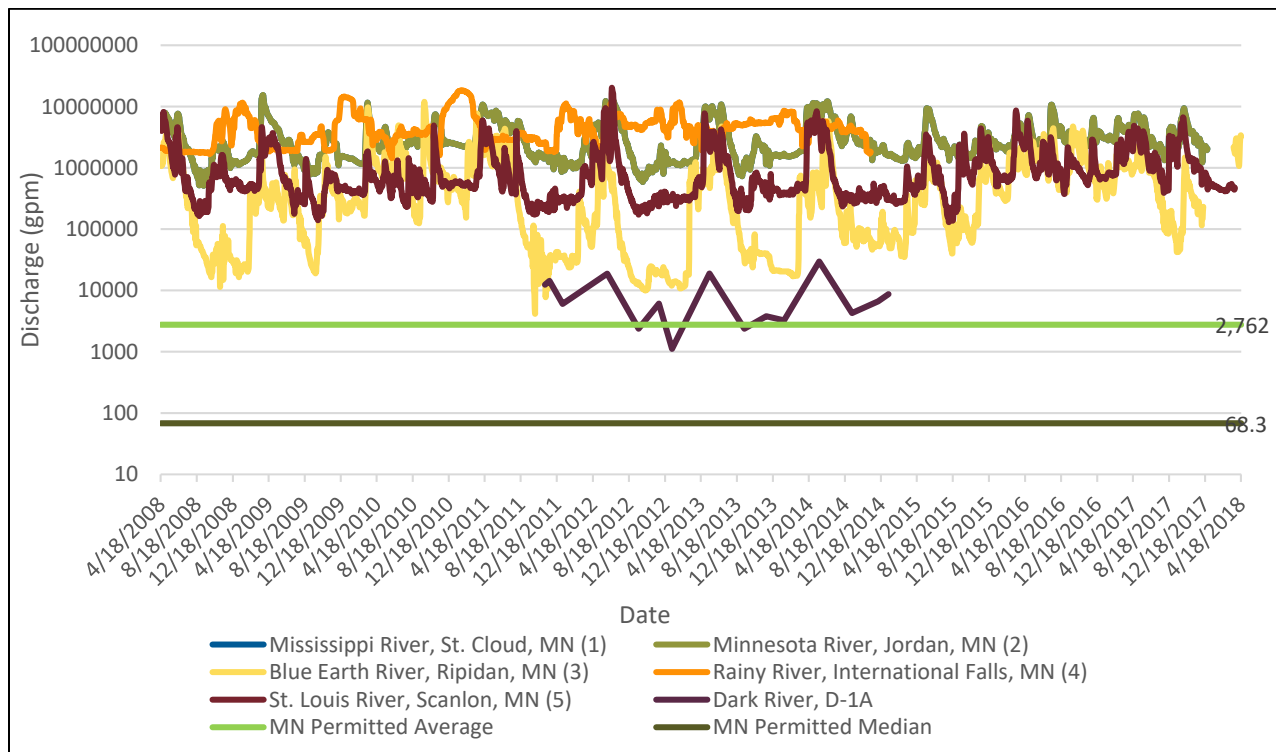
Month	Average Monthly Flow for Natural Flow Conditions (gpm)
	D-1A
January	4,772
February	9,496 <sup>(1)</sup>
March	10,348 <sup>(1)</sup>
April	24,251 <sup>(1)</sup>
May	24,275
June	14,497
July	16,970
August	3,833
September	3,007
October	13,962 <sup>(1)</sup>
November	9,164
December	6,647

(1) Data are unavailable for these months. Average monthly flow data were interpolated from D-1 data using a regression analysis ( $y=2.7704x - 1.0568$ ;  $R^2 = 0.82$ ).

Industrial consumption appropriation permits are typically granted to higher order streams than the Dark River. For example, throughout Minnesota, the streams/ivers with the most water appropriation permits for industrial processing uses are: Mississippi River (26 permits), Minnesota River (14 permits), Blue Earth River (7 permits), St. Louis River (7 permits), and Rainy River (5 permits) (reference (27)). These waterbodies are higher order, have much higher flow volumes, and are not characteristically ‘flashy’ intermittent systems, resulting in more reliable flows necessary to support industrial appropriations. Table 7-7 provides an overview of water appropriation permits for industrial processing in Minnesota. The flow rates of these rivers are compared to monitoring point D-1A, as well as the average (2,762 gpm) and median (68.3 gpm) total permitted volume of industrial processing appropriation permits from streams/ivers in Minnesota, in Figure 7-2. The USGS stations used in Figure 7-2 include 05288500 (Mississippi River at St. Cloud), 05330000 (Minnesota River at Jordan), 05320000 (Blue Earth River at Ripidan), 05129515 (Rainy River at International Falls), and 04024000 (St. Louis River at Scanlon). Active groundwater and surface water appropriation permits for industrial processing uses are shown on Large Figure 16.

**Table 7-7 Summary of Water Appropriation Permits for Industrial Processing throughout Minnesota**

Resource Type	Total Number of Permits	Permit Status		Total Permitted Volume (gpm)			
		Number of Active Permits	Number of Inactive Permits	Minimum	Maximum	Average	Median
Ditch	11	2	9	19.0	552	180	79.9
Dug Pit/Holding Pond	153	82	71	0	3,425	223	60.9
Groundwater	1,759	729	1,030	0	9,513	429	91.3
Lake	113	22	91	0	201,674	9,973	97.9
Quarry/Mine	131	83	48	0	34,700	6,718	285
Sand/Gravel Pit	22	14	8	0.951	584	65.7	5.71
Stream/River	179	33	146	0	47,565	2,762	68.3
Wetland	19	2	17	4.19	2,283	343	34.2

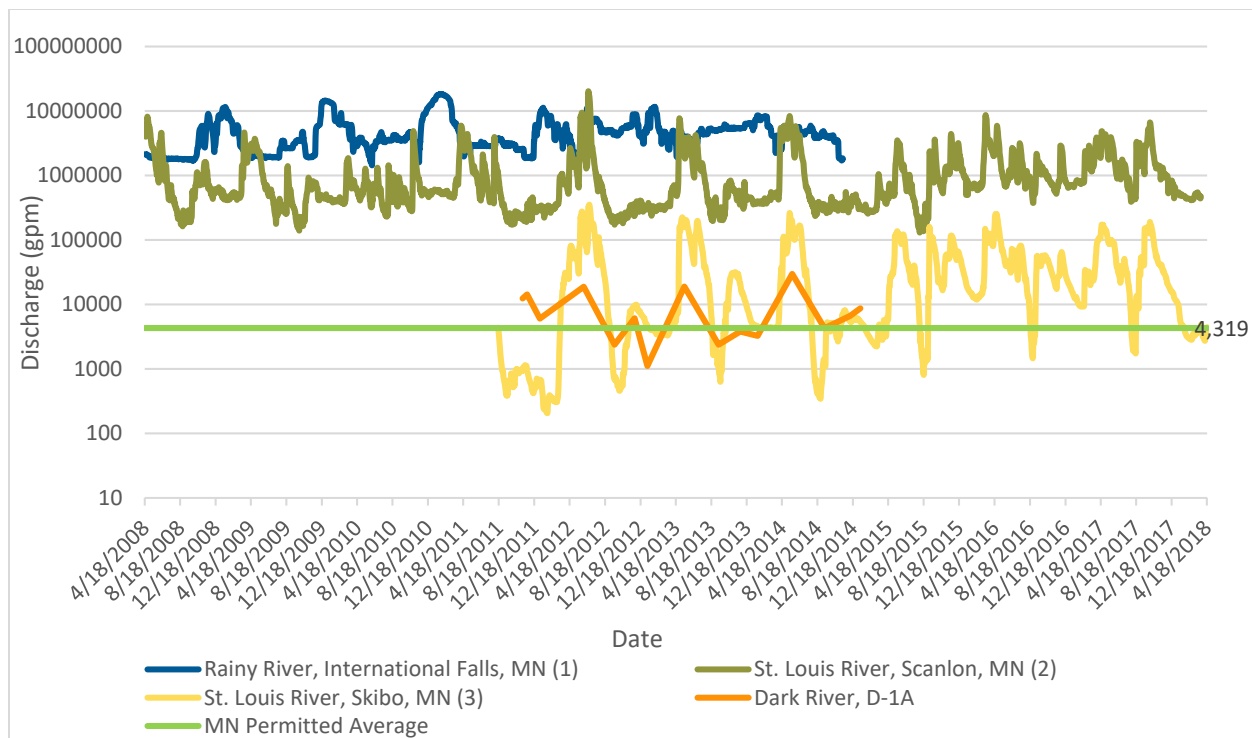


**Figure 7-2 The Dark River Designated Trout Stream Compared to Rivers/Streams in the State of Minnesota with the Most Water Industrial Processing Appropriation Permits Flow Rates and Minnesota Median and Average Industrial Processing Appropriations Volumes**

Industrial processing water appropriation permits in St. Louis County are summarized in Table 7-8. There are no industrial appropriation permits within St. Louis County on streams that are characteristically similar to the Dark River designated trout stream. The lowest order stream in St. Louis County with an active industrial processing permit is the St. Louis River. A comparison of the flow rates of the St. Louis River, Rainy River, and monitoring point D-1A, as well as the average (4,319 gpm) total permitted volume of industrial processing appropriation permits from streams/ivers in St. Louis County, is provided in Figure 7-3. The USGS stations used in Figure 7-3 include 05129515 (Rainy River at International Falls), 04024000 (St. Louis River at Scanlon), and 04015438 (St. Louis River at Skibo). Active water appropriation permits for industrial processing uses within St. Louis County are shown on Large Figure 17.

**Table 7-8 Summary of Water Appropriation Permits for Industrial Processing in St. Louis County**

Resource Type	Total Number of Permits	Permit Status		Total Permitted Volume (gpm)			
		Number of Active Permits	Number of Inactive Permits	Minimum	Maximum	Average	Median
Ditch	5	1	4	79.9	552	316	316
Dug Pit/Holding Pond	17	3	14	0	2,283	1,014	177
Groundwater	60	17	43	0	2,283	715	139
Lake	30	9	21	0	22,831	4,246	951
Quarry/Mine	32	20	12	17.1	34,700	10,662	6,499
Sand/Gravel Pit	1	1	0	--	--	285	--
Stream/River	15	2	13	0	13,318	3,408	2,378
Wetland	2	0	2	1,200	1,200	1,200	1,200



**Figure 7-3 The Dark River Designated Trout Stream Compared to St. Louis County Rivers/Streams with the Most Industrial Processing Water Appropriations Flow Rates, Dark River Designated Trout Stream Flow Rates and Average Industrial Processing Appropriations**

### 7.3.3 Attainment of Water Quality Standards

Section 5.3.1 and Large Table 3 include a comparison of the Class 3B water quality standards to water quality data collected from the Dark River designated trout stream. The Class 3B water quality standard for hardness has been exceeded in the Dark River designated trout stream. Attainment of this water quality standard for a non-existent and unattainable use is an unnecessary hardship and expense for upstream dischargers and does not support the overall use and value of the water.

### 7.3.4 Conclusion

The Class 3B use is unattainable and does not support the use and value of the Dark River designated trout stream due to the following factors:

- A review of industrial consumption water appropriations permits and historical imagery show that Class 3B industrial consumption use is not an existing use for the Dark River designated trout stream.
- Minnesota Statutes and Rules render the Class 3B industrial consumption designated use unattainable for the Dark River designated trout stream.
  - Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.

- Minnesota Statutes, section 103G. 285, subdivision 2 limits water appropriations during low flows. Such a limitation would not be acceptable to an industrial appropriator since industrial operations are not seasonally limited. Furthermore, Minnesota Statutes, section 103G.261(a)(5) deprioritizes industrial appropriations making it unlikely that it would be a prioritized use during times of low flow.
- Minn. Stat 103G.301, subdivision 1 requires potential appropriators to consider alternatives to the proposed water source to be appropriated. Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water from the Dark River designated trout stream. An industrial consumption water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical. Groundwater resources would be seen as a preferred alternative.
- Low flow and natural flow conditions per 40 CFR 131.10(g)(2) *Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements* render the Class 3B industrial consumption designated use unattainable for the Dark River designated trout stream.
  - The average industrial consumption appropriation in Minnesota is a significant portion of the Dark River designated trout stream mean annual flow ; such that an appropriation could be reasonably expected to cause ecological harm.
  - The average industrial consumption appropriation in Minnesota is greater than 20% of the Dark River designated trout stream August flow volume; such an appropriation is very unlikely to be permitted by the MNDNR because an appropriation of that nature would cause ecological harm during critical months.
  - Industrial appropriators require consistent and reliable water resources to remain profitable. The Dark River designated trout stream would not provide a reliable water source that could guarantee uninterrupted operations.
  - Industrial appropriations are not sourced from low-order streams like the Dark River. As evidenced by a review of the rivers with the highest frequency of industrial appropriations permits, industrial appropriations occur on higher-order streams with consistent base flows.

This assessment supports removal of the Class 3B industrial consumption designated use from the Dark River designated trout stream.

## 7.4 Class 4A Agricultural Irrigation

This section demonstrates that the Class 4A designated use is not attainable due to Minnesota Statute and Rule and existing soil types/agricultural suitability and natural weather conditions. Further, the use

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and value of the Dark River designated trout stream does not support retaining the Class 4A agricultural irrigation designated use.

### **7.4.1 Class 4A Use is Unattainable due to Minnesota Statutes and Rules**

Minnesota Statutes and Rules include provisions that either prohibit or hinder the attainability of the Class 4A use for the Dark River designated trout stream. This section identifies these statutes and rules and their applicability to the Dark River designated trout stream and the Class 4A use.

#### **7.4.1.1 Appropriations Prohibited from Trout Streams**

The application of the agricultural irrigation beneficial use (Minnesota Rules, part 7050.0420) for the protection the Dark River designated trout stream contradicts Minnesota Statutes, section 103G.285, subdivision 5, which states that *"Permits issued after June 3, 1977, to appropriate water from streams designated trout streams by the commissioner's orders... must be limited to temporary appropriations."* Agricultural appropriations are not temporary, as shown through a review of the agricultural irrigation category in the MNDNR database (reference (27)). Appropriations from the Dark River designated trout stream are therefore considered not possible.

Although agricultural irrigation is seasonal, it is not considered "temporary." A temporary appropriation is time limited and then no longer required. Agricultural appropriations, although limited to the growing season, are required year after year and would require a permanent intake structure. Temporary appropriations include appropriations for purposes such as construction dewatering.

Further discussion on Minnesota Statutes, section 103G.285, subdivision 5 is also included in Section 7.1.1.1 as it pertains to the Class 1B designated use.

### **7.4.2 Consumptive Appropriations are Limited During Periods of Low Flows**

Minnesota Statutes, section 103G. 285, subdivision 2 requires that *"permits to appropriate water from natural...watercourses must be limited so that consumptive appropriations are not made from watercourses during periods of specified low flows."* The statute identifies that the purpose is to *"safeguard water availability for in-stream uses and for downstream higher priority users located reasonably near the site of appropriation."*

Low flow conditions occur in mid-winter and mid- to late- summer when water availability for aquatic life uses and other potential beneficial uses is already scarce. The Dark River is a characteristically "flashy" system, meaning that flow volumes are influenced primarily by precipitation rather than groundwater. Therefore, when hypothetical agricultural appropriators would need to appropriate water, these water bodies would also be at their lowest flows. This typically occurs in late-summer when agricultural irrigation is required. Minnesota Statutes explicitly limits consumptive uses during these low-flow conditions.

#### 7.4.2.1 Alternative Options Must Be Evaluated

Minn. Stat 103G.301, subdivision 1 requires that an application must take into account *“alternatives to the actions proposed in the permit application, including conservation measures to improve water use efficiencies and reduce water demand”* and *“anticipated changes in water and related land resources.”*

Similarly, Minnesota Rules, part 6115.0660, subpart 3 requires information of a potential appropriator applying for an agricultural irrigation appropriation permit. These rules show that an appropriation from the Dark River designated trout stream would not be approved. Minnesota Rules, part 6115.0660, subpart 3(E) requires that applicants must supply a *“Statement of justification supporting the reasonableness and practicality of use with respect to adequacy of the water source, amounts of use, and purposes”* with adequate facts regarding the *“(1) hydrology and hydraulics of the water sources involved, including for surface waters the applicant's analysis of the effect of proposed withdrawals on levels and flows and anticipated impacts...”* In addition, an applicant must supply information on *“(5) alternative sources of water or methods which were considered, to attain the appropriation objective and why the particular alternative proposed in the application was selected.”*

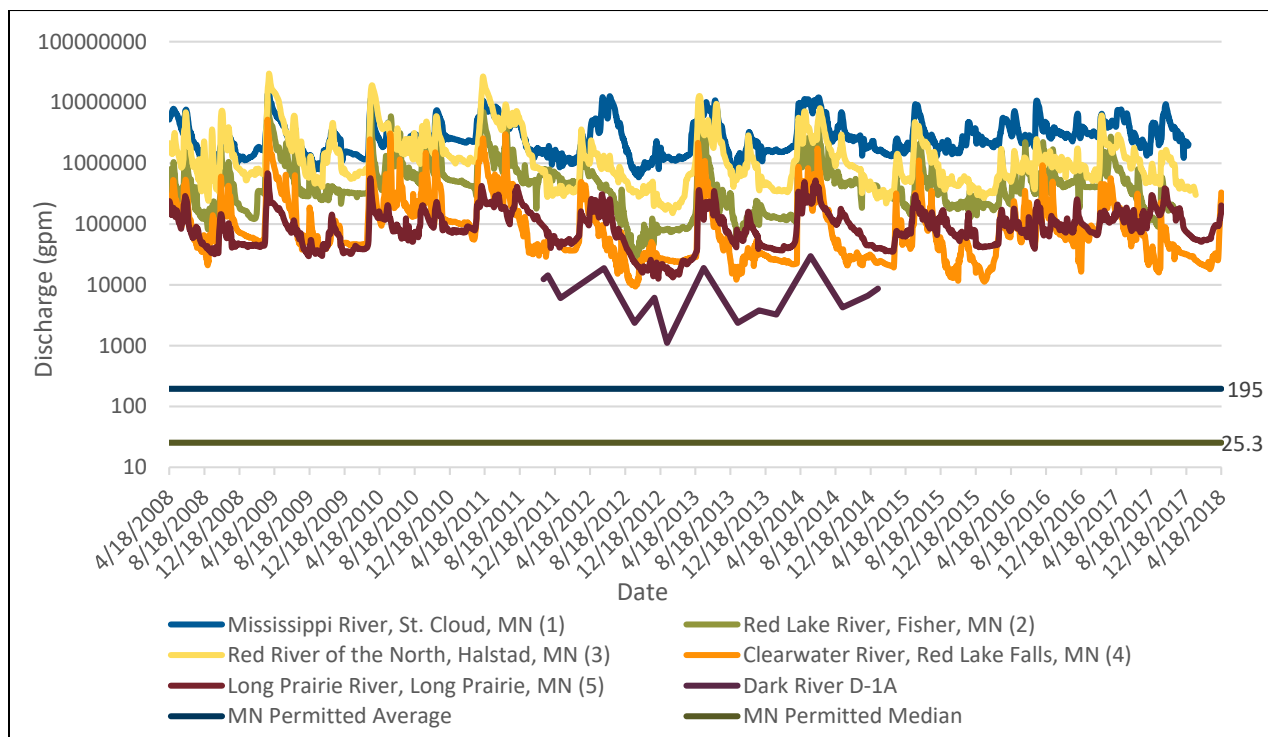
The potential appropriator would have to consider other water source options in order to gather approval, which would show that an appropriation is not consistent with Minnesota Statute, not necessary, and not an appropriate use of the Dark River designated trout stream. Groundwater appropriations instead of surface water appropriations allow an appropriator to have reliable flow, the ability to appropriate adequate volume for crop irrigation, the ability to allocate water without causing ecological harm, and does not jeopardize the Class 2A aquatic life beneficial use. It is also reasonable to assume that a water appropriations permit from the Dark River designated trout stream would not be approved by the MNDNR because groundwater is a preferred alternative.

#### 7.4.3 Agricultural Irrigation Water Supplies are Sourced from Higher Flow Streams

Agricultural irrigation water supplies are sourced from higher flow streams. Agricultural appropriations do not support the use and value of the Dark River designated trout stream. Table 7-9 provides an overview of water appropriation permits for agricultural irrigation in Minnesota. Throughout Minnesota, the streams/rivers with the most water appropriation permits for agricultural irrigation are: Mississippi River (125 permits), Red Lake River (103 permits), Clearwater River (93 permits), Red River of the North (76 permits), and Long Prairie River (46 permits). The flow rates of these rivers are compared to monitoring point D-1A, as well as the average (195 gpm) and median (25.3 gpm) total permitted volume of agricultural irrigation appropriation permits from streams/rivers in Minnesota, in Figure 7-4. The USGS stations used in Figure 7-4 include 05270700 (Mississippi River at St. Cloud), 05080000 (Red Lake River at Fisher), 05064500 (Red River of the North at Halstad), 05078500 (Clearwater River at Red Lake Falls), and 05245100 (Long Prairie River at Long Prairie). Active groundwater and surface water appropriation permits for agricultural irrigation uses are shown on Large Figure 18.

**Table 7-9 Summary of Water Appropriation Permits for Agricultural Irrigation in Minnesota**

Resource Type	Total Number of Permits	Permit Status		Permit Total Volume (gpm)			
		Number of Active Permits	Number of Inactive Permits	Minimum	Maximum	Average	Median
Ditch	361	128	233	1.52	19,024	345	76.1
Dug Pit/Holding Pond	690	225	465	0	571	60.0	42.3
Groundwater	9,790	7,299	2,491	0	1,689	79.2	76.1
Lake	560	75	485	0	634	29.6	16.3
Quarry/Mine	38	13	25	2.66	508	96.5	75.5
Sand/Gravel Pit	13	3	10	21.1	62.8	51.8	30.4
Stream/River	1,590	299	1,291	0	3,702	195	25.3
Wetland	168	26	142	1.90	263	24.6	12.7



**Figure 7-4 Comparison of Select St. Louis County Rivers/Streams Flow Rates, Dark River Designated Trout Stream Flow Rates, and Agricultural Irrigation Appropriations**

Table 7-9 and Figure 7-4 provide evidence that most agricultural irrigation water is appropriated from groundwater rather than surface waters. Figure 7-4 also provides evidence that agricultural irrigation water is also sourced from higher-order streams, which have a higher baseflow and more reliable natural

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flow conditions. Additionally, the streams/ivers with the most agricultural irrigation water appropriation permits in Minnesota have significantly greater flow rates than the Dark River designated trout stream.

There are no active water appropriation permits for the purpose of agricultural irrigation in St. Louis County, Cook County, or Lake County. However, there are 28 active agricultural irrigation water appropriations permits from streams/ivers in other northeastern Minnesota counties (including Koochiching, Carlton, Aitkin, and Itasca counties). The median total permitted volume of these active appropriation permits is 133 gpm, while the average total permitted volume of these active appropriation permits is 291 gpm.

#### **7.4.4 Class 4A Use is Unattainable due to Low Crop Productivity and Economics**

Costs associated with agricultural irrigation from surface waters do not allow for attainment of the agricultural irrigation uses for agricultural products as “truck garden crops”, which are commodities that require a profit to operate. Irrigating agricultural areas adjacent to the waterbodies using surface waters is uneconomical.

The land area within one mile of the Dark River designated trout stream was assessed for agricultural suitability. Land areas were excluded from the assessment if the land was a wetland or inaccessible due to wetlands (refer also to Large Figure 21). Areas were deemed inaccessible if a road to the land had to go through a wetland. Minnesota Rules, part 8420.0122, subpart 7 prohibits forest roads for conversion of lands to agricultural use. Crop productivity was estimated for remaining land that is not wetland and is accessible by road.

Minnesota IT Services Geospatial Information Office maintains a Cropland Productivity Index (CPI) (reference (39)). Minnesota Cropland Productivity Index rates cropland suitability on a scale of 0 to 100, where 100 references the most suitable land for cropland. Land within the Dark River designated trout stream buffer area has varying CPI, but is most typically less than 75. CPI values within a one mile buffer of the Dark River designated trout stream are shown on Large Figure 22. The CPIs near the Dark River designated trout stream have a lower estimated crop productivity rating than typical cropland. For comparison, lands that are used for agriculture in southern Minnesota have CPIs in the high-90s. Lands used for cropland in the Rainy River watershed, an agricultural area in northern Minnesota that lies within sediments from Glacial Lake Agassiz, typically have CPIs in the high-80s. It is also important to note, that after clearing and grubbing, which would result in removal of the ‘A’ horizon, CPIs can be expected to be lower. Higher CPIs within the Dark River watershed are associated with tree farms; however, tree farms are not irrigated and thus not applicable to the Class 4A use.

The U.S. Department of Agriculture (USDA) maintains a database of census information that indicates approximately where different types of agriculture are located in Minnesota (reference (40)). This information was used to determine the types of agriculture that should be considered in this evaluation. This evaluation considered “truck garden crops,” which are extremely limited in St. Louis County, as well as hay crops. Truck garden crops by definition must be considered as a commodity, and thus must be profitable in order to be economically feasible. Truck garden crop farms are typically 1 to 4 acres in size (reference (41)).

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Hay crop is the dominant agricultural commodity in St. Louis County. The maximum amount of area for a hay operation could be approximately 25 acres to accommodate irrigation not greater than 10% of the August flow for the Dark River designated trout stream. However, on the area of land considered most appropriate for agricultural irrigation, non-public wetland inventory wetlands are present, thus it was determined that irrigating and farming 25 acres is not attainable.

Table 7-10 shows the cost evaluation for the areas of contiguous land that could be farmable and irrigated adjacent to the Dark River designated trout stream, which include a theoretical 15.4 acre hay farm and theoretical 2.6 acre truck garden crop farm. The rate of return on investment only considers the cost to prep land for agriculture and install infrastructure for appropriating surface water. Table 7-10 does not consider additional cost considerations, such as operations and maintenance of capital and ongoing time and materials. Clearly, the proposition of either as a business strategy is uneconomical and would not be considered. These returns are likely on the higher end as the resources used to generate the estimated return on operations are sourced from more temperate climates, Michigan (reference (42)) and Iowa (reference (43)). The University of Minnesota Extension provides some estimates on agricultural returns, but no such estimates are available for northeastern Minnesota or the type of operations that could exist in northeastern Minnesota.

Further, it is critical to note that hay crop is *rarely* irrigated (reference (44)) and to do so would make it extremely unlikely to be profitable. Hay crop is usually not a commodity crop, but rather a crop that is ancillary to existing farm operations, which are extremely limited in the area (reference (45)).

**Table 7-10 Land and Irrigation Preparation Costs for Land Area Most Amenable to Agricultural Irrigation**

Categories	Hay Field Plot	Farm to Market Plot
Ownership <sup>(1)</sup>	USFS- Superior National Forest	
Projected Acres	15.4	2.6
Road Costs	\$16,551	\$16,551
Grubbing Costs	\$7,854	\$1,144
Irrigation Costs	\$60,680	\$42,840
Land Purchase Costs	\$43,120	\$7,280
<b>Equipment Capital Outlay</b>	<b>\$60,000<sup>(2)</sup></b>	<b>\$81,000<sup>(2)(3)</sup></b>
<b>Total Cost (\$)</b>	<b>\$188,205</b>	<b>\$148,815</b>
<b>Cost/Acre (\$)</b>	<b>\$12,547</b>	<b>\$57,236</b>
<b>Estimated Return on Operation/year (\$)</b>	<b>\$5,208<sup>(4)</sup></b>	<b>\$17,000<sup>(5)</sup></b>
<b>Amount of Time to Recover Initial Expenditure (years)</b>	<b>36.1 years</b>	<b>8.8 years</b>

- (1) Assumes land is able to be acquired from United States Forest Service at typical appraised cost for land in area. No additional cost considerations for acquiring land from a federal agency were considered.
- (2) Capital outlay costs include \$20,000 for a tractor, \$25,000 for a shed/outbuilding, rototiller, \$15,000 miscellaneous equipment (i.e. mulch layer, transplanted, drip irrigation equipment). Costs are actually much higher with typical capital outlay (reference (43))
- (3) Assumes three fixed high tunnels at approximately \$7,000/high tunnel with 30x72 square feet.
- (4) Estimate return on operation/year is based on reference (42)
- (5) Estimated return on operation/year is based on reference (43)

#### 7.4.5 Class 4A is Unattainable due to Use of Surface Water as a Microbial Food Safety Hazard

Agricultural irrigation for truck garden crops should not be sourced from surface waters because truck garden crops consist of fresh fruits and vegetables (e.g., strawberries, whole carrots, radishes, tomatoes, celery, broccoli, cauliflower, and salad greens that are not subject to processing or are minimally processed). These foods, unlike corn or soybeans, are more susceptible to microbial contamination, such as *E. coli*, from surface waters (reference (46)).

Irrigation practices that expose the edible portion of plants to direct contact with contaminated water may increase microbial food safety risks (reference (47)), especially for those crops and regions where irrigation is likely to occur close to harvest. It would be nearly impossible to prevent edible portions of truck garden crops from coming in contact with potentially contaminated surface waters. Moreover, irrigation would be most likely to occur in August, close to harvest.

The Food and Drug Administration recommends not using surface water for irrigation for fresh fruits and vegetables because surface waters can be subject to intermittent, temporary contamination. It is generally assumed that groundwater is less likely to be contaminated with high levels of pathogens than surface

water, such that it is recommended that surface waters be regularly tested for pathogens. The FDA notes that “Water quality, especially surface water quality, can vary with time (e.g., seasonally or even hourly), and a single test may not indicate the potential for water to be contaminated. Furthermore, testing water may not reveal specific pathogens if they are present in low numbers” (reference (46)).

The FDA does not recommend using surface waters in areas with high concentrations of wildlife because this is a potential source of water contamination. The FDA recommends limiting the potential contamination sources from occurring to minimize microbial food safety hazards; however, it would be impossible to limit wildlife from using the Dark River designated trout stream. The FDA also recommends fast moving surface waters if surface waters are used for agricultural irrigation. Flow in the Dark River designated trout stream in August is typically slowest.

#### **7.4.6 Length of Growing Season Limits Agriculture**

The Dark River designated trout stream is located in USDA Zone 3b with minimum temperatures of -30 to -35 degrees Fahrenheit, such that the last frost is expected on May 15<sup>th</sup> and the first frost on September 15<sup>th</sup> (reference (48)). The Dark River watershed and USDA Plant Hardiness Zone 3b is shown on Large Figure 23. The number of normal corn growing degree days in the area around the Dark River designated trout stream are shown in Large Figure 24. Large Figure 23 and Large Figure 24 illustrate that the area near the Dark River has some of the coldest temperatures and shortest growing season in not only the state, but also the contiguous United States.

Most crops in this zone need to be started indoors to survive in the Dark River watershed area. Some crops must even be started indoors before the last anticipated frost and are projected to be harvested after the first anticipated frost in Zone 3b. Many common crops would need to be maintained in a high tunnel, hoop house, or greenhouse in order to grow. Other crops in Zone 3b need to be grown under a caterpillar tunnel, floating rows, or other weather management system in order to survive in the climate (reference (49) and reference (50)).

This assessment shows that the length of growing season limits agriculture and the ability to produce a profitable commodity, or truck garden crop. The area around the Dark River designated trout stream has some of the lowest minimum temperatures and shortest growing season in the contiguous United States. Initiating a profitable agricultural operation in this area would most likely be infeasible. The only method for producing crops from planting to harvest would be to extend the growing season using weather management systems. Using weather management systems would require more capital expenditure; therefore, it may not be possible to get returns on the investment for these systems in a reasonable timeframe.

#### **7.4.7 Attainment of Water Quality Standards**

Section 5.3.1 and Large Table 3 include a comparison of the Class 4A water quality standards to water quality data collected from the Dark River designated trout stream. The Class 4A water quality standards for bicarbonates, total dissolved solids, and specific conductance have been exceeded in the Dark River designated trout stream. Attainment of these water quality standards for a non-existent and unattainable

use is an unnecessary hardship and expense for upstream dischargers and does not support the overall use and value of the water.

#### 7.4.8 Conclusion

The Class 4A use is unattainable and does not support the use and value of the Dark River designated trout stream due to the following factors:

- A review of agricultural irrigation water appropriations permits, evidence of wild rice presence, and historical imagery show that the Class 4A agricultural irrigation use is not an existing use for the Dark River designated trout stream.
- Minnesota Statutes and Rules render the Class 4A industrial consumption designated use unattainable for the Dark River designated trout stream.
  - Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.
  - Minnesota Statutes, section 103G. 285, subdivision 2 limits water appropriations during low flows. Such a limitation would not be acceptable to an agricultural irrigation appropriator since agricultural operations need to appropriate water during times of drought, which would correspond to when irrigation is most needed to prevent crop loss or failure.
  - Minn. Stat 103G.301, subdivision 1 requires potential appropriators to consider alternatives to the proposed water source to be appropriated. Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water from the Dark River designated trout stream. An agricultural irrigation water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical. Groundwater resources would be seen as a preferred alternative.
- Natural flow conditions per 40 CFR 131.10(g)(2) *Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements* render the Class 4A industrial consumption designated use unattainable for the Dark River designated trout stream.
  - Agricultural irrigation is typically sourced from higher order streams than the Dark River that provide a more consistent year-round baseflow than the Dark River designated trout stream. As evidenced by a review of the rivers with the highest frequency of industrial appropriations permits, industrial appropriations occur on higher-order streams with

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consistent base flows. This is critical for agricultural operations because when flow is at the minimum is when irrigation use is most critical.

- Agriculture for the purpose of producing truck garden crops (e.g. a profitable commodity) is unattainable near the Dark River designated trout stream because crop productivity is low and such an operation is not economically viable.
- Agricultural irrigation for truck garden crops from a surface water can result in microbial food safety hazards. With the number of wildlife using the Dark River designated trout stream limiting potential contamination sources is impossible.
- The length of growing season limits agriculture for the purpose of producing a profitable commodity. The area around the Dark River trout stream has some of the lowest minimum temperatures and thus one of the lowest plant hardiness zones (Zone 3b) in the contiguous United States. Most crops need a weather management system (i.e. hoop house, high tunnel, etc.) to be able to be planted and harvested within the short growing season. This further illustrates that it is likely uneconomical to have an agricultural irrigation operation in the area of the Dark River designated trout stream.

This assessment supports removal of the Class 4A agricultural irrigation designated use from the Dark River designated trout stream.

## **7.5 Class 4B, Livestock Watering and Wildlife**

An evaluation of the attainability of the Class 4B designated use is not included in this submittal.

## **7.6 Class 5, Aesthetic Enjoyment and Navigation**

An evaluation of the attainability and use and value of the Class 5 designated use is not included in this submittal. The Class 5 use is an existing use, and thus has been attained. For further discussion on Class 5 use refer also to Section 6.6.

## **7.7 Class 6, Other Uses**

An evaluation of the attainability of the Class 6 designated use is not included in this submittal. The Class 6 use is an existing use, and thus has been attained. For further discussion on Class 6 use refer also to Section 6.7.

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## 8 Designated Uses are Protected Downstream

The Dark River and Sturgeon River downstream of the Dark River designated trout stream are classified by the default beneficial uses for unlisted waterbodies. These default uses and this section provides an evaluation of the Class 2B (aquatic life and recreation), Class 3C (industrial consumption), Class 4A (agricultural irrigation), Class 4B (livestock watering and wildlife), Class 5 (aesthetic enjoyment and navigation), and Class 6 (other uses) water use classifications for downstream waters. The Class 1B designated use does not apply to downstream waters and thus is not included in this assessment. This assessment shows that the designated uses downstream of the Dark River designated trout stream on the Dark River are protected.

### 8.1 Class 2B – Aquatic Life and Recreation

Information included in Section 5.1, 6.2, and 7.2 show that the Class 2A use in the Dark River designated trout stream is an existing use that has been attained and is protected. There are no water quality standards exceedances of Class 2A parameters within the Dark River designated trout stream. Data support that Class 2A narrative standards are being attained.

The Dark River downstream of the Dark River designated trout stream is a Class 2B water, which typically has less stringent water quality standards than Class 2A water quality standards. Because Class 2A water quality standards and narrative standards are met in the Dark River designated trout stream, any impacts to downstream waters would not be the result of the Dark River designated trout stream.

### 8.2 Class 3C – Industrial Consumption

Information included in Section 6.3 and Section 7.3 describe that the Class 3B use for the Dark River designated trout stream is neither existing nor attainable. Section 5.3.1 describes hardness water quality exceedances on the Dark River designated trout stream.

The Dark River downstream of the Dark River designated trout stream is a Class 3C water, which has a hardness water quality standard with a higher concentration than the Class 3B water quality standard. Data have been collected downstream of the Dark River designated trout stream as described in Section 5.4.1. These data indicate that all Class 3C water quality standards are met.

### 8.3 Class 4A – Agricultural Irrigation

Information included in Section 6.4 and Section 7.4 describe that the Class 4A use for the Dark River designated trout stream is neither existing nor attainable. Section 5.3.1 describes water quality exceedances in the Dark River designated trout stream and includes a discussion on bicarbonates, total dissolved solids, and specific conductance.

Data have been collected downstream of the Dark River designated trout stream as described in Section 5.4.1. These data indicate that all applicable Class 4A water quality standards are met.

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## **8.4 Class 4B – Livestock Watering and Wildlife Uses**

Information included in Section 6.5 and Section 7.5 describe the Class 4B use for the Dark River designated trout stream. Available data shows that the Class 4B use is met downstream.

Therefore, downstream uses are also being protected on the Dark River downstream of the Dark River designated trout stream.

## **8.5 Class 5 – Aesthetic Enjoyment and Navigation Uses**

Information included in Section 6.6 and Section 7.6 show that the Class 5 use is existing and attainable on the Dark River designated trout stream. There are no water quality exceedances of Class 5 parameters and data support that the Class 5 narrative standards are being met.

Therefore, downstream uses are also being protected on the Dark River downstream of the Dark River designated trout stream.

## **8.6 Class 6 – Other Uses**

Information included in Section 6.7 and Section 7.7 show that the Class 6 use is existing and attainable on the Dark River designated trout stream. There are no water quality exceedances of Class 6 parameters and data support that the Class 5 narrative standards are being met.

Therefore, downstream uses are also being protected on the Dark River downstream of the Dark River designated trout stream.

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## 9 Recommendations

This document provides information supporting a UVD for the Dark River designated trout stream. Based on the analysis of existing uses, attainable uses, and the use and value of the Dark River designated trout stream, U. S. Steel recommends the following actions:

Remove the Class 1B (domestic consumption) use from the Dark River designated trout stream based on the following reasons:

- A review of public water supplies, self-supplied domestic consumption, and historical imagery show that Class 1B domestic consumption use is not an existing use for the Dark River designated trout stream.
- Minnesota Statutes and Rules render the Class 1B domestic consumption designated use unattainable for the Dark River designated trout stream.
  - Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.
  - Minnesota Statutes, section 103G.271, subdivision 1 hinders potential applicants from obtaining a water use permit due to riparian rights. Riparian landowners adjacent to the Dark River designated trout stream do not require domestic water supplies from a surface water source.
  - Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water from the Dark River designated trout stream. A domestic consumption water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical.
- Low flow and natural flow conditions per 40 CFR 131.10(g)(2) render the Class 1B domestic consumption designated use unattainable for the Dark River designated trout stream.
  - The average domestic consumption appropriation in Minnesota is greater than the Dark River designated trout stream mean annual flow; such an appropriation is impossible.
  - The average domestic consumption appropriation in Minnesota is greater than the Dark River designated trout stream August flow volume; such an appropriation is impossible.
  - An appropriation for domestic consumption may harm aquatic life uses
- Populations in the vicinity of the Dark River designated trout stream are not increasing and/or current water supplies are sufficient, such that new water supplies do not need to be sought.
  - In the event that new water sources for nearby towns would need to be identified, the Dark River designated trout stream is unsuitable due to its distance from nearby towns and numerous wetlands in between the towns and the stream.

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- Remove the Class 3B (industrial consumption) use from the Dark River designated trout stream based on the following reasons:
  - A review of industrial consumption water appropriations permits and historical imagery show that Class 3B industrial consumption use is not an existing use for the Dark River designated trout stream.
  - Minnesota Statutes and Rules render the Class 3B industrial consumption designated use unattainable for the Dark River designated trout stream.
    - Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.
    - Minnesota Statutes, section 103G. 285, subdivision 2 limits water appropriations during low flows. Such a limitation would not be acceptable to an industrial appropriator since industrial operations are not seasonally limited. Furthermore, Minnesota Statutes, section 103G.261(a)(5) deprioritizes industrial appropriations making it unlikely that it would be a prioritized use during times of low flow.
    - Minn. Stat 103G.301, subdivision 1 requires potential appropriators to consider alternatives to the proposed water source to be appropriated. Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water from the Dark River designated trout stream. An industrial consumption water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical. Groundwater resources would be seen as a preferred alternative.
  - Low flow and natural flow conditions per 40 CFR 131.10(g)(2) render the Class 3B industrial consumption designated use unattainable for the Dark River designated trout stream.
    - The average industrial consumption appropriation in Minnesota is a significant portion of the Dark River designated trout stream mean annual flow; such that an appropriation could be reasonably expected to cause ecological harm.
    - The average industrial consumption appropriation in Minnesota is greater than 20% of the Dark River designated trout stream August flow volume; such an appropriation is very unlikely to be permitted by the MNDNR because an appropriation of that nature would cause ecological harm during critical months.
    - Industrial appropriators require consistent and reliable water resources to remain profitable. The Dark River designated trout stream would not provide a reliable water source that could guarantee uninterrupted operations.
    - Industrial appropriations are not sourced from low-order streams like the Dark River. As evidenced by a review of the rivers with the highest frequency of industrial appropriations

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permits, industrial appropriations occur on higher-order streams with consistent base flows.

Remove the Class 4A (agricultural irrigation) use from the Dark River designated trout stream based on the following reasons:

- A review of agricultural irrigation water appropriations permits, evidence of wild rice presence, and historical imagery show that the Class 4A agricultural irrigation use is not an existing use for the Dark River designated trout stream.
- Minnesota Statutes and Rules render the Class 4A industrial consumption designated use unattainable for the Dark River designated trout stream.
  - Minnesota Statutes, section 103G.271, subdivision 5 prohibits potential applicants from obtaining a water appropriations permit from trout streams after 1977.
  - Minnesota Statutes, section 103G. 285, subdivision 2 limits water appropriations during low flows. Such a limitation would not be acceptable to an agricultural irrigation appropriator since agricultural operations need to appropriate water during times of drought, which would correspond to when irrigation is most needed to prevent crop loss or failure.
  - Minn. Stat 103G.301, subdivision 1 requires potential appropriators to consider alternatives to the proposed water source to be appropriated. Minnesota Rules, part 6115.0660, subpart 3 requires that potential applicants for a water use permit must justify the reasonableness and practicality of appropriating water from the Dark River designated trout stream. An agricultural irrigation water appropriation from the Dark River designated trout stream is not justifiable, reasonable, or practical. Groundwater resources would be seen as a preferred alternative.
- Natural flow conditions per 40 CFR 131.10(g)(2) render the Class 4A industrial consumption designated use unattainable for the Dark River designated trout stream.
  - Agricultural irrigation is typically sourced from higher order streams than the Dark River that provide a more consistent year-round baseflow than the Dark River designated trout stream. As evidenced by a review of the rivers with the highest frequency of industrial appropriations permits, industrial appropriations occur on higher-order streams with consistent base flows. This is critical for agricultural operations because when flow is at the minimum is when irrigation use is most critical.
- Agriculture for the purpose of producing truck garden crops (e.g. a profitable commodity) is unattainable near the Dark River designated trout stream because crop productivity is low and such an operation is not economically viable.

- Agricultural irrigation for truck garden crops from a surface water can result in microbial food safety hazards. With the number of wildlife using the Dark River designated trout stream limiting potential contamination sources is impossible.
- The length of growing season limits agriculture for the purpose of producing a profitable commodity. The area around the Dark River trout stream has some of the lowest minimum temperatures and thus one of the lowest plant hardiness zones (Zone 3b) in the contiguous United States. Most crops need a weather management system (i.e. hoop house, high tunnel, etc.) to be able to be planted and harvested within the short growing season. This further illustrates that it is likely uneconomical to have an agricultural irrigation operation in the area of the Dark River designated trout stream.

A summary of the recommendations is included in Table 9-1. U. S. Steel recommends that the Dark River designated trout stream be re-classified as Class 2A, 4B, 5, and 6 designated uses, which will accurately reflect the existing uses, attainable uses, and use and value of the waterbody.

**Table 9-1 Summary of Recommended Actions for Dark River Designated Trout Stream**

Current Use Designation	Recommended for Removal
1B	X
2A	
3B	X
4A	X
4B	
5	
6	

Minnesota Rules, part 7050.0405, subpart 2 specifies requirements by the MPCA Commissioner upon receiving a petition for considering a reclassification of a waterbody's designated uses. Minnesota Rules, part 7050.0405 states:

*Upon receiving a petition, the commissioner has 60 days to reply in writing and indicate a plan for disposition of the petition. The commissioner may request additional information from the petitioner if the request is considered incomplete, in which case the commissioner has 60 days to reply after the additional information is received and the petition is complete. If the commissioner finds that the evidence submitted supports a review of the designated uses, a use attainability analysis must be commenced within six months of the commissioner's reply to the complete petition. The petition becomes part of the use attainability analysis. If the commissioner finds that the use attainability analysis supports a change in use classification, the commissioner shall propose the change through rulemaking.*

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U. S. Steel requests that the MPCA respond to this petition within the required timeframe, and commence rulemaking using the recommendations and supporting information in this document.

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## Large Tables

Large Table 1 Fish Species Frequency on the Dark River Designated Trout Stream and Downstream Sturgeon River

Station, from upstream to downstream	Dustin <sup>(1)</sup> (ID: Hwy 65 Control) <sup>(2)</sup>					Dustin <sup>(1)</sup> (ID: Hwy 65 Work) <sup>(2)</sup>					Dustin <sup>(1)</sup> (ID: Potlatch 2 Control)					Dustin <sup>(1)</sup> (ID: Potlatch 1 Work)					Dustin <sup>(1)</sup> (ID: Leander Work)					Dustin <sup>(1)</sup> (ID: Reference)					Dark River Design. Trout Stream (99NF120)	Sturgeon River (05RN059)	
Sample Year	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005 <sup>(3)</sup>	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2008	2005	
Total Species	11	11	10	9	16	12	13	15	16	16	12	--	9	8	15	10	10	10	10	16	--	--	12	6	15	9	10	12	11	15	16	20	
Bigmouth shiner	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	0	
Black bullhead	3	1	1	0	2	0	1	1	1	2	1	--	0	0	0	0	0	0	1	0	--	--	0	0	0	0	0	0	0	2	0	2	0
Blacknose dace	7	10	0	9	27	6	33	11	162	42	13	--	4	0	65	12	6	14	0	110	--	--	18	0	139	1	10	8	0	12	27	0	
Blackside darter	0	0	0	0	2	0	1	1	2	3	0	--	0	3	2	0	3	0	3	0	--	--	2	0	2	6	13	27	27	1	2	215	
Bluegill	16	2	0	0	1	4	6	2	3	1	3	--	0	0	17	6	1	0	0	7	--	--	0	0	4	1	1	2	1	16	1	1	
Brook trout	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	0	0	0	121	0	0	
Central mudminnow	100	20	14	26	16	25	56	60	53	8	12	--	15	32	9	31	7	2	41	16	--	--	4	0	1	0	2	0	0	0	16	2	
Common shiner	0	0	5	0	31	6	1	13	0	29	0	--	4	0	74	0	0	4	0	64	--	--	1	0	29	0	0	0	0	5	31	36	
Creek chub	16	25	35	125	80	22	35	140	0	66	62	--	32	63	74	29	4	16	66	110	--	--	113	21	57	17	22	99	74	113	80	0	
Golden redhorse	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	5	
Golden shiner	0	0	0	0	0	0	0	1	0	0	0	--	0	0	0	0	0	0	0	1	--	--	0	0	1	0	0	0	0	0	0	3	
Iowa Darter	3	3	0	0	1	0	0	0	0	0	0	--	0	0	0	0	0	2	0	0	--	--	0	0	0	0	0	0	0	0	1	0	
Johnny Darter	1	2	0	20	20	0	4	4	32	21	2	--	4	9	26	8	1	10	5	9	--	--	7	1	1	1	0	5	7	1	20	92	
Lamprey ammocaoete	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	27	
Largemouth bass	0	0	0	0	1	1	0	1	1	0	0	--	0	0	6	0	0	0	0	6	--	--	0	0	1	0	0	1	0	0	1	1	
Longnose dace	0	0	0	4	0	2	0	11	6	2	8	--	1	0	4	2	0	7	20	16	--	--	4	10	43	4	12	1	5	6	0	17	
Minic shiner	0	0	0	0	0	0	0	0	46	0	0	--	0	0	0	0	0	0	0	1	--	--	0	0	0	0	0	0	0	0	0	5	
Mottled sculpin	1	1	4	0	2	2	5	4	6	4	7	--	3	11	18	20	1	13	26	16	--	--	25	18	20	11	0	44	57	46	2	6	
Northern brook lamprey	0	0	1	0	0	0	0	0	3	3	4	--	0	0	19	0	2	0	4	11	--	--	6	5	6	1	2	22	10	4	0	0	
Northern pike	0	0	1	0	5	0	0	0	5	11	0	--	0	0	0	0	0	0	0	3	--	--	0	0	1	0	0	0	0	2	5	7	

Station, from upstream to downstream	Dustin <sup>(1)</sup> (ID: Hwy 65 Control) <sup>(2)</sup>					Dustin <sup>(1)</sup> (ID: Hwy 65 Work) <sup>(2)</sup>					Dustin <sup>(1)</sup> (ID: Potlatch 2 Control)					Dustin <sup>(1)</sup> (ID: Potlatch 1 Work)					Dustin <sup>(1)</sup> (ID: Leander Work)					Dustin <sup>(1)</sup> (ID: Reference)					Dark River Design. Trout Stream (99NF120)	Sturgeon River (05RN059)
Northern redbelly dace	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	0
Pearl dace	5	5	0	5	4	0	14	79	40	2	0	--	0	1	2	0	0	0	4	2	--	--	8	0	1	0	9	10	2	3	4	0
Rock bass	3	0	14	12	24	4	6	10	23	44	1	--	0	2	12	0	0	0	0	3	--	--	0	0	0	1	0	1	0	2	24	16
Shorthead redhorse	0	0	0	0	0	8	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	1	0	0	0	0	40
Silver redhorse	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	3
Smallmouth bass	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	1
Trout perch	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	5
White sucker	9	3	32	50	48	3	5	72	71	73	30	--	47	101	38	120	25	23	25	37	--	--	21	5	22	20	8	33	22	42	48	2
Yellow perch	0	2	3	4	2	2	8	0	5	14	1	--	3	0	2	10	1	1	0	0	--	--	1	0	0	0	0	0	0	1	2	1

Note: General table information based on information in reference (5)

- (1) Reference (7); surveys involved single-pass electrofishing with either barge or backpack shockers
- (2) Site Highway 65 Control is located upstream of groundwater inputs on the Dark River designated trout stream
- (3) Only one backpack shocker was used in this survey

Large Table 2 Biological Monitoring Data for the Little Fork Watershed

General Reach Location	Monitoring Location	F-IBI Threshold / F-IBI Upper Confidence Limit (CL) <sup>(2)</sup>	F-IBI	F-IBI > Threshold / Upper CL?	Fish Survey Date	M-IBI Threshold / M-IBI Upper CL <sup>(2)</sup>	M-IBI	M-IBI > Threshold / Upper CL?	HBI / Water Quality Evaluation Rating	Macro-invertebrate Survey Date	Habitat MSHA Score / Rating <sup>(2)(3)</sup>	TALU Fish Biocriterion / Upper CL <sup>(4) (5)</sup>	TALU Macro-invertebrate Biocriterion / Upper CL <sup>(4) (5)</sup>	F-IBI > TALU Biocriterion? / Upper CL <sup>(4) (5)</sup>	M-IBI > TALU Biocriterion? / Upper CL <sup>(4) (5)</sup>	Meets TALU biocriterion? <sup>(6)</sup>
MPCA Monitoring Stations <sup>(1)</sup>																
Dark River Designated Trout Stream	Station 99NF120	N/A	47	N/A	Jun-08	37/ N/A	38.4	Yes / N/A	5.3 / Good	Aug-08	74 / Good	35 / 45	32 / 44	Yes / Yes	Yes / No	Unknown
		N/A	34	N/A	Aug-08	26 / N/A	38.4	Yes / N/A						No / No	Yes / No	
Downstream of Dark River (Sturgeon River)	Station 05RN059	50 / 59	74	Yes / Yes	Aug-05	52.4 / 66	89.7	Yes / Yes	5.4 / Good	Aug-05	60 / Fair	47 / 56	51 / 65	Yes / Yes	Yes / Yes	No
			81	Yes / Yes	Sep-05		90.1	Yes / Yes						Yes / Yes	Yes / Yes	
Other Cold Water Streams	Johnson Creek	N/A	15	No data	Jun-08	37/ N/A	18	No / N/A	5.2 / Good	Jun-08	55 / Fair	35 / 45	32 / 44	No / No	No / No	Yes
						26 / N/A	18	No / N/A							No / No	
	Sand Creek	N/A	25	No data	Sep-08	37/ N/A	17.5	No / N/A	5.4 / Good	Jun-08	72 / Good	35 / 45	32 / 44	No / No	No / No	Yes
						26 / N/A	17.5	No / N/A							No / No	
						37/ N/A	36.5	Yes / N/A	4.8 / Good	Sep-08					Yes / No	
						26 / N/A	36.5	No / N/A							Yes / No	
	Stony Brook, Station 08RN042	N/A	44	No data	Jun-08	37/ N/A	25 <sup>(2)(7)</sup>	No / N/A	6.2 / Fair	Aug-08 <sup>(7)</sup>	65 / Fair	35 / 45	32 / 44	Yes / No	No / No	Yes
					Jul-08	26 / N/A	25 <sup>(2)(7)</sup>	No / N/A							No / No	
			34			24	No / N/A	Jun-08		No / No				No / No		
	Stony Brook, Station 15EM013	N/A	46	No data	Jun-15	N/A <sup>(1)</sup>	17	N/A	4.8 / Good	Jun-15	No data	35 / 45	32 / 44	Yes / Yes	No / No	Yes
			51		Aug-15	N/A <sup>(1)</sup>	26	N/A	4.7 / Good	Aug-15				Yes / Yes	No / No	
	Valley River, Station 08RN020	N/A	34	No data	Jul-08	37/ N/A	39.8	Yes / N/A	4.6 / Good	Aug-08	83 / Good	35 / 45	32 / 44	No / No	Yes / No	Yes
						26 / N/A	39.8	Yes / N/A							Yes / No	
	Valley River, Station 08RN037	N/A	30	No data	Jun-08	37/ N/A	32.7	No / N/A	5. 9 / Fair	Aug-08	72 / Good	35 / 45	32 / 44	No / No	Yes / No	Yes
						26 / N/A	32.7	Yes / N/A							Yes / No	
	Trib. to Valley River	N/A	29	No data	Jun-08	37/ N/A	21.2	No / N/A	5.4 / Good	Aug-08	70 / Good	35 / 45	32 / 44	No / No	No / No	Yes
						26 / N/A	21.2	No / N/A							No / No	
	Venning Creek	N/A	14	No data	Jun-08	37/ N/A	34.8	No / N/A	5.6 / Good	Aug-08	70 / Good	35 / 45	32 / 44	No / No	Yes / No	Yes
						26 / N/A	34.8	Yes / N/A							Yes / No	
Minntac Dark River Monitoring Data <sup>(8)</sup>																
Dark River designated trout stream	DR04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	DR05	N/A	54.8	N/A	Oct-17	N/A	80.1	N/A	4.71 / Good	Oct-17	79 / Good	35 / 45	32 / 44	Yes / Yes	Yes / Yes	Yes
Dark River, downstream of designated trout stream	DR06	N/A	67.3	N/A	Oct-17	N/A	56.7	N/A	6.09 / Fair	Oct-17	70 / Good	47 / 56	53 / 66	Yes / Yes	Yes / No	Yes

MNDNR Dark River Monitoring Data																
Dark River designated trout stream	"DR1", near CR 65 <sup>(9)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Multihabitat: 5.45 / Good	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	"DR2", between CR 65 and CR 688 <sup>(9)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Rock habitat: 3.5 / Very Good	N/A	N/A	N/A	N/A	N/A	N/A	N/A
									Multihabitat: 4.1 / Very Good							
	"DR3", between CR 65 and CR 688 <sup>(9)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Rock habitat: 4.2 / Very Good	N/A	N/A	N/A	N/A	N/A	N/A	N/A
									Multihabitat: 4.4 / Very Good							
	"DR4", at CR 688 <sup>(9)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Multihabitat: 4.05 / Very Good	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	"Highway 65 Control" <sup>(10)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.34 / Fair	2004	N/A	N/A	N/A	N/A	N/A	N/A
									5.98 / Fair							
									6.66 / Fairly Poor	2005						
	"Highway 65 Work" <sup>(10)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.77 / Fair	2004	N/A	N/A	N/A	N/A	N/A	N/A
									6.83 / Fairly Poor	2005						
	"Potlatch 2 Control" <sup>(10)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.94 / Good	2004	N/A	N/A	N/A	N/A	N/A	N/A
									4.50 / Very Good	2005						
	"Potlatch 1 Work" <sup>(10)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.53 / Good	2005	N/A	N/A	N/A	N/A	N/A	N/A
	"Leander" <sup>(10)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.91 / Very Good	2005	N/A	N/A	N/A	N/A	N/A	N/A
	"Reference Reach" <sup>(10)</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.77 / Very Good	2004	N/A	N/A	N/A	N/A	N/A	N/A
									2.65 / Excellent	2005						

(1) Data retrieved from the MPCA online water quality data (reference (9))

(2) Data retrieved from the Little Fork River WMAR (reference (5)); thresholds/confidence limits for F-IBI and confidence limits for M-IBI in cold water streams were not established at the time of sampling; an exceedance of the upper confidence limit indicates “good biological condition” while additional information, such as habitat, water chemistry, land use, etc., shall be used to determine the biological condition for a site receiving a score between confidence limits (reference (5))

(3) Good ≥ 66, fair = 45-65, and poor ≤ 44

(4) The Sturgeon River is classified as a Class 2Bg Northern Streams for fish and a Class 2Bg Northern Forest Stream (Pools/Glides) for macroinvertebrates; cold water streams, including the Dark River designated trout stream are Class 2Ag Coldwater Streams for fish and macroinvertebrates; the Dark River downstream of the designated trout stream is classified as a Class 2Bg Northern Stream for fish and a Class 2Bg Northern Forest Stream (Riffle/Run) for macroinvertebrates

(5) Biocriterion from Minnesota Rules, part 7050.0222 supersede IBI criteria thresholds used in (reference (5)); confidence limits are not yet published by the MPCA and were provided by the MPCA via personal communication

(6) Use met and attainable if all data for either F-IBI or M-IBI ≥ biocriterion

(7) IBI scores in the WMAR (reference (9)) differ from MPCA’s online data system (reference (9))

(8) Data retrieved from reference (2)

(9) Data retrieved from reference (12)

(10) Data retrieved from reference (7) and reference (8)

Large Table 3 Water Quality and Standards Comparison

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1, 2)</sup>								Most Stringent Standard	Monitoring Location D-1A <sup>(11)</sup>			Downstream of Dark River Designated Trout Stream (County Road 688 at Graham Road) <sup>(11)</sup>			Sturgeon River (County Road 652 at Goodell Road) <sup>(11)</sup>		
		Class 1B <sup>(3)</sup>	Class 2A <sup>(4)</sup>	Class 2B <sup>(5)</sup>	Class 3B <sup>(6)</sup>	Class 3C <sup>(7)</sup>	Class 4A <sup>(8)</sup>	Class 4B <sup>(9)</sup>	Class 5 <sup>(10)</sup>		Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances
Miscellaneous Substance, Characteristic, or Pollutant																			
Asbestos (fiber > 10 µm)	MFL	7								7 (Class 1B)	No Data			No Data			No Data		
Ammonia un-ionized as N	µg/L		16	40						16 (Class 2A)	7	7.7	1 exceedance of Class 2A	No Data			No Data		
Bicarbonates (HCO <sub>3</sub> )	mg/L						305			305 (Class 4A)	19	217	3 exceedances of Class 4A	4	141	0	5	63.8	0
Biochemical oxygen demand (BOD <sub>5</sub> )	mg/L		1.5	1.5						1.5 (Class 2A & 2B)	3	1.07	0	No Data			No Data		
Chloride	mg/L	250	230	230	100	250				100 (Class 3B)	20	30.5	0	4	15.6	0	5	5.9	0
Chlorine, total residual	µg/L		11	11						11 (Class 2A & 2B)	1	< 20	0	No Data			No Data		
Chlorophyll-a (seston)	µg/L		7	7						7 (Class 2A & 2B)	3	1.4	0	No Data			No Data		
Color Value	Pt/Co	15	30							15 (Class 1B)	No Data			No Data			No Data		
Corrosivity	--	Non-corrosive								Non-corrosive (Class 1B)	No Data			No Data			No Data		
Cyanide, free	µg/L	200	5.2	5.2						5.2 (Class 2A & 2B)	1	< 16.0	0	No Data			No Data		
Diel dissolved oxygen flux	mg/L		3.0	3.0						3.0 (Class 2A & 2B)	No Data			No Data			No Data		
Dissolved oxygen	mg/L		7.0 (as a daily minimum)	5.0 (as a daily minimum)						7.0 (Class 2A)	5	10.7	0	No Data			No Data		
Escherichia (E.) coli <sup>(12)</sup>	organisms/100 mL		126	126						126 (Class 2A & 2B)	1	2.0	0	No Data			No Data		
			1260	1260															
Fluoride <sup>(13)</sup>	mg/L	4.0								2.0 (Class 1B)	4	0.36	0	No Data			No Data		
		2.0																	
Foaming Agents	mg/L	0.5								0.5 (Class 1B)	No Data			No Data			No Data		
Hardness, Ca + Mg as CaCO <sub>3</sub>	mg/L				250	500				250 (Class 3B)	19	523	18 exceedances of Class 3B; 8 exceedances of Class 3C	4	303	0	5	104	0
Hydrogen sulfide as S	mg/L								0.02	0.02 (Class 5)	No Data			No Data			No Data		

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1, 2)</sup>								Most Stringent Standard	Monitoring Location D-1A <sup>(11)</sup>			Downstream of Dark River Designated Trout Stream (County Road 688 at Graham Road) <sup>(11)</sup>			Sturgeon River (County Road 652 at Goodell Road) <sup>(11)</sup>		
		Class 1B <sup>(3)</sup>	Class 2A <sup>(4)</sup>	Class 2B <sup>(5)</sup>	Class 3B <sup>(6)</sup>	Class 3C <sup>(7)</sup>	Class 4A <sup>(8)</sup>	Class 4B <sup>(9)</sup>	Class 5 <sup>(10)</sup>		Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances
Nitrate (as N)	mg/L	10								10 (Class 1B)	No Data			No Data			No Data		
Nitrite (as N)	mg/L	1								1 (Class 1B)	No Data			No Data			No Data		
Odor	TON	3								3 (Class 1B)	No Data			No Data			No Data		
Oil	µg/L		500	500						500 (Class 2A & 2B)	1	< 2900	0	No Data			No Data		
pH	SU	6.5 to 8.5	6.5 to 8.5	6.5 to 9.0	6.0 to 9.0	6.0 to 9.0	6.0 to 8.5	6.0 to 9.0	6.0 to 9.0	6.5 to 8.5 (Class 1B & 2A)	23	7.88	0	4	8.1	0	5	7.9	0
Phosphorus	µg/L		50	50						50 (Class 2A & 2B)	14	25.0	0	No Data			No Data		
Radioactive Materials	--		Narrative <sup>(14)</sup>	Narrative <sup>(14)</sup>			Narrative <sup>(14)</sup>	Narrative <sup>(14)</sup>		Narrative	No Data			No Data			No Data		
Specific Conductance	µmhos/cm						1000			1000 (Class 4A)	23	977	10 exceedances of Class 4A	4	572	0	5	217	0
Sulfate	mg/L	250					10 <sup>(15)</sup>			10 (Class 4A)	19	290	10 exceedances of Class 1B	4	154	0	5	35.6	0
Temperature	°F		No material increase	Narrative <sup>(16)</sup>						Narrative	23	51.4	0	4	61.0	0	5	64.9	0
Total Dissolved Solids	mg/L	500					700			500 (Class 1B)	19	678	14 exceedances of Class 1B; 8 exceedances of Class 4A	4	410	0	5	165	0
Total Salinity	mg/L							1000		1000 (Class 4B)	No Data			No Data			No Data		
Total Suspended Solids	mg/L		10 <sup>(17)</sup>	15						10 (Class 2A)	5	5.4	0	No Data			No Data		
Toxic substances	--							Narrative <sup>(18)</sup>		Narrative (Class 4B)	No Data			No Data			No Data		
Metals and Elements																			
Aluminum	µg/L	50 to 200	87	125						50 (Class 1B)	1	85.5	1 exceedance of Class 1B	No Data			No Data		
Antimony	µg/L	6	5.5	31						5.5 (Class 2A)	1	< 0.50	0	No Data			No Data		
Arsenic	µg/L	10	2.0	53						2.0 (Class 2A)	1	0.86	0	No Data			No Data		
Barium	mg/L	2								2 (Class 1B)	No Data			No Data			No Data		
Beryllium	mg/L	0.004								0.004 (Class 1B)	No Data			No Data			No Data		
Boron	mg/L						0.5			0.5 (Class 4A)	4	0.056	0	4	0.0563	0	5	0.06	0

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1, 2)</sup>								Most Stringent Standard	Monitoring Location D-1A <sup>(11)</sup>			Downstream of Dark River Designated Trout Stream (County Road 688 at Graham Road) <sup>(11)</sup>			Sturgeon River (County Road 652 at Goodell Road) <sup>(11)</sup>		
		Class 1B <sup>(3)</sup>	Class 2A <sup>(4)</sup>	Class 2B <sup>(5)</sup>	Class 3B <sup>(6)</sup>	Class 3C <sup>(7)</sup>	Class 4A <sup>(8)</sup>	Class 4B <sup>(9)</sup>	Class 5 <sup>(10)</sup>		Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances
Cadmium <sup>(19)</sup>	µg/L	5	3.4	3.4						2.0 (Class 2A & 2B)	1	< 0.20	0	No Data			No Data		
Chromium +3, total <sup>(19)</sup>	µg/L	100	644	644						100 (Class 1B)	1	< 20.0	0	No Data			No Data		
Chromium +6, total	µg/L		11	11						11 (Class 2A & 2B)	1	< 20.0	0	No Data			No Data		
Cobalt	µg/L		2.8	5.0						2.8 (Class 2A)	1	0.41	0	No Data			No Data		
Copper, total <sup>(19)</sup>	µg/L		15	23						1.0 (Class 1B)	1	1.3	0	No Data			No Data		
Iron	mg/L	0.3								0.3 (Class 1B)	No Data			No Data			No Data		
Lead <sup>(19)</sup>	µg/L		19	19						7.7 (Class 2A & 2B)	1	< 0.50	0	No Data			No Data		
Manganese	µg/L	50								50 (Class 1B)	No Data			No Data			No Data		
Mercury, total in water	ng/L	2000	6.9	6.9						6.9 (Class 2A & 2B)	1	1.04	0	No Data			No Data		
Mercury, total in edible fish	mg/kg		0.2	0.2						0.2 (Class 2A & 2B)	No Data			No Data			No Data		
Nickel, total <sup>(19)</sup>	µg/L		297	509						283 (Class 2A & 2B)	1	< 0.50	0	No Data			No Data		
Selenium	µg/L	50	5.0	5.0						5.0 (Class 2A & 2B)	1	1.2	0	No Data			No Data		
Silver <sup>(19)</sup>	µg/L	100	0.12	1.0						0.12 (Class 2A)	1	< 0.20	0	No Data			No Data		
Sodium	meq/L						60% of total cations			60% of total cations (Class 4A)	19	20.9 mg/L	0	4	12.1 mg/L	0	5	5.1 mg/L	0
Thallium	µg/L	2	0.28	0.56						0.28 (Class 2A)	1	< 0.20	0	No Data			No Data		
Zinc <sup>(19)</sup>	mg/L	5	343	343						5 (Class 1B)	1	< 6.0	0	No Data			No Data		
Organic Pollutants or Characteristics																			
Acenaphthene	µg/L		20	20						20 (Class 2A & 2B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Acetochlor	µg/L		3.6	3.6						3.6 (Class 2A & 2B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Acrylonitrile	µg/L		0.38	0.89						0.38 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Alachlor	µg/L	2	3.8	59						2 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1, 2)</sup>								Most Stringent Standard	Monitoring Location D-1A <sup>(11)</sup>			Downstream of Dark River Designated Trout Stream (County Road 688 at Graham Road) <sup>(11)</sup>			Sturgeon River (County Road 652 at Goodell Road) <sup>(11)</sup>		
		Class 1B <sup>(3)</sup>	Class 2A <sup>(4)</sup>	Class 2B <sup>(5)</sup>	Class 3B <sup>(6)</sup>	Class 3C <sup>(7)</sup>	Class 4A <sup>(8)</sup>	Class 4B <sup>(9)</sup>	Class 5 <sup>(10)</sup>		Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances
Anthracene	µg/L		0.035	0.035						0.035 (Class 2A & 2B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Atrazine	µg/L	3	3.4	10						3 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Benzene	µg/L	5	5.1	98						5 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Benzo(a)pyrene (PAHs)	mg/L	0.0002								0.0002 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Bromoform	µg/L		33	466						33 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Carbofuran	mg/L	0.04								0.04 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Carbon tetrachloride	µg/L	5	1.9	5.9						1.9 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Chlordane	ng/L	2000	0.073	0.29						0.073 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Chlorobenzene (Monochlorobenzene)	µg/L	100	20	20						20 (Class 2A & 2B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Chloroform	µg/L		53	155						53 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Chlorpyrifos	µg/L		0.041	0.041						0.041 (Class 2A & 2B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
2,4-D	mg/L	0.07								0.07 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Dalapon	mg/L	0.2								0.2 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
DDT	ng/L		0.11	1.7						0.11 (Class 2A)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
1,2-Dibromo-3-chloropropane (DBCP)	mg/L	0.0002								0.0002 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
o-Dichlorobenzene	mg/L	0.6								0.6 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
p-Dichlorobenzene	mg/L	0.075								0.075 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
1,2-Dichloroethane	µg/L	5	3.5	190						3.5 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1, 2)</sup>								Most Stringent Standard	Monitoring Location D-1A <sup>(11)</sup>			Downstream of Dark River Designated Trout Stream (County Road 688 at Graham Road) <sup>(11)</sup>			Sturgeon River (County Road 652 at Goodell Road) <sup>(11)</sup>		
		Class 1B <sup>(3)</sup>	Class 2A <sup>(4)</sup>	Class 2B <sup>(5)</sup>	Class 3B <sup>(6)</sup>	Class 3C <sup>(7)</sup>	Class 4A <sup>(8)</sup>	Class 4B <sup>(9)</sup>	Class 5 <sup>(10)</sup>		Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances
1,1-Dichloroethylene	mg/L	0.007								0.007 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
cis-1,2-Dichloroethylene	mg/L	0.07								0.07 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
trans-1,2-Dichloroethylene	mg/L	0.1								0.1 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Dichloromethane	mg/L	0.005								0.005 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
1,2-Dichloropropane	mg/L	0.005								0.005 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Di(2-ethylhexyl) adipate	mg/L	0.4								0.4 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Di(2-ethylhexyl) phthalate	µg/L	6	1.9	2.1						1.9 (Class 2A)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Di-n-octyl phthalate	µg/L		30	30						30 (Class 2A & 2B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Dieldrin	ng/L		0.0065	0.026						0.0065 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Dinoseb	mg/L	0.007								0.007 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Dioxin (2,3,7,8-TCDD)	µg/L	0.00003								0.00003 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Diquat	mg/L	0.02								0.02 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Endosulfan	µg/L		0.0076	0.031						0.0076 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Endothall	mg/L	0.1								0.1 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Endrin	µg/L	2	0.0039	0.016						0.0039 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Ethylbenzene	µg/L	700	68	68						68 (Class 2A & 2B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Ethylene dibromide	mg/L	0.00005								0.00005 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Fluoranthene	µg/L		1.9	1.9						1.9 (Class 2A & 2B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1, 2)</sup>								Most Stringent Standard	Monitoring Location D-1A <sup>(11)</sup>			Downstream of Dark River Designated Trout Stream (County Road 688 at Graham Road) <sup>(11)</sup>			Sturgeon River (County Road 652 at Goodell Road) <sup>(11)</sup>		
		Class 1B <sup>(3)</sup>	Class 2A <sup>(4)</sup>	Class 2B <sup>(5)</sup>	Class 3B <sup>(6)</sup>	Class 3C <sup>(7)</sup>	Class 4A <sup>(8)</sup>	Class 4B <sup>(9)</sup>	Class 5 <sup>(10)</sup>		Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances
Glyphosate	mg/L	0.7								0.7 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Heptachlor	ng/L	400	0.1	0.39						0.1 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Heptachlor epoxide	ng/L	200	0.12	0.48						0.12 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Hexachlorobenzene	ng/L	1000	0.061	0.24						0.061 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Hexachlorocyclopentadiene	mg/L	0.05								0.05 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Lindane (Hexachlorocyclohexane, gamma-)	µg/L	0.2	0.0087	0.036						0.0087 (Class 2A)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Methoxychlor	mg/L	0.04								0.04 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Methylene chloride (Dichloromethane)	µg/L		45	1940						45 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Metolachlor	µg/L		23	23						23 (Class 2A & 2B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Naphthalene	µg/L		65	81						65 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Oxamyl (Vydate)	mg/L	0.2								0.2 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Parathion	µg/L		0.013	0.013						0.013 (Class 2A & 2B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Polychlorinated biphenyls (PCBs)	ng/L	500	0.014	0.029						0.014 (Class 2A)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Pentachlorophenol	µg/L	1	0.93	5.5 <sup>(20)</sup>						0.93 (Class 2A)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Phenanthrene	µg/L		3.6	3.6						3.6 (Class 2A & 2B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Phenol	µg/L		123	123						123 (Class 2A & 2B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Picloram	mg/L	0.5								0.5 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Simazine	mg/L	0.004								0.004 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1, 2)</sup>								Most Stringent Standard	Monitoring Location D-1A <sup>(11)</sup>			Downstream of Dark River Designated Trout Stream (County Road 688 at Graham Road) <sup>(11)</sup>			Sturgeon River (County Road 652 at Goodell Road) <sup>(11)</sup>		
		Class 1B <sup>(3)</sup>	Class 2A <sup>(4)</sup>	Class 2B <sup>(5)</sup>	Class 3B <sup>(6)</sup>	Class 3C <sup>(7)</sup>	Class 4A <sup>(8)</sup>	Class 4B <sup>(9)</sup>	Class 5 <sup>(10)</sup>		Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances
Styrene	mg/L	0.1								0.1 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
1,1,2,2-Tetrachloroethane	µg/L		1.1	13						1.1 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Tetrachloroethylene	µg/L	5	3.8	8.9						3.8 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Toluene	µg/L	1	253	253						1 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Toxaphene	ng/L	3000	0.31	1.3						0.31 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
2,4,5-TP (Silvex)	mg/L	0.05								0.05 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
1,2,4-Trichlorobenzene	mg/L	0.07								0.07 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
1,1,1-Trichloroethane	µg/L	200	329	329						200 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
1,1,2-Trichloroethane	mg/L	0.005								0.005 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
1,1,2-Trichloroethylene	µg/L		25	120						25 (Class 2A)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
2,4,6-Trichlorophenol	µg/L		2.0	2.0						2.0 (Class 2A & 2B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Trichloroethylene	mg/L	0.005								0.005 (Class 1B)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Vinyl chloride	µg/L	2	0.17	9.2						0.17 (Class 2A)	No data; Believed absent; Analysis not required per 40 CFR 122, Appendix D			No data; Believed absent			No data; Believed absent		
Xylenes (total)	µg/L	10000	166	166						166 (Class 2A & 2B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Radionuclides																			
Alpha particles	pCi/L	15								15 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Beta particles and photon emitters	millirems/year	4								4 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Radium 226 and Radium 228 (combined)	pCi/L	5								5 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1, 2)</sup>								Most Stringent Standard	Monitoring Location D-1A <sup>(11)</sup>			Downstream of Dark River Designated Trout Stream (County Road 688 at Graham Road) <sup>(11)</sup>			Sturgeon River (County Road 652 at Goodell Road) <sup>(11)</sup>		
		Class 1B <sup>(3)</sup>	Class 2A <sup>(4)</sup>	Class 2B <sup>(5)</sup>	Class 3B <sup>(6)</sup>	Class 3C <sup>(7)</sup>	Class 4A <sup>(8)</sup>	Class 4B <sup>(9)</sup>	Class 5 <sup>(10)</sup>		Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances	Number of Samples	Average	Number of Exceedances
Uranium	µg/L	30								30 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Disinfection Byproducts																			
Bromate	mg/L	0.010								0.010 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Chlorite	mg/L	1.0								1.0 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Haloacetic acids (HAA5)	mg/L	0.060								0.060 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		
Total Trihalomethanes (TTHMs)	mg/L	0.080								0.080 (Class 1B)	No data; Believed absent			No data; Believed absent			No data; Believed absent		

- (1) Per Minnesota Rules, part 7050.0410 and part 7050.0470, subpart 2.A(10), Dark River is designated as Class 1B, 2A, 3B, 3C, 4A, 4B, 5, and 6. Dark River is also a designated trout stream per Minnesota Rules part 6264.0050, subpart 4.PP(24). The Sturgeon River and the portion of the Dark River that is not designated as a trout stream are designated as Class 2B, 3C, 4A, 4B, 5, and 6.
- (2) Although all surface waters are protected for Class 6, Class 6 has no numeric standards. Therefore, Class 6 is not included in the table.
- (3) Class 1B water quality standards are found in Minnesota Rules, part 7050.0221, subpart 3 and incorporate the EPA's primary (maximum contaminant levels) and secondary drinking water standards by reference.
- (4) Class 2A water quality standards are found in Minnesota Rules, part 7050.0222, subpart 2.
- (5) Class 2B water quality standards are found in Minnesota Rules part 7050.0222, subpart 4.
- (6) Class 3B water quality standards are found in Minnesota Rules part 7050.0223, subpart 3.
- (7) Class 3C water quality standards are found in Minnesota Rules part 7050.0223, subpart 4.
- (8) Class 4A water quality standards are found in Minnesota Rules part 7050.0224, subpart 2.
- (9) Class 4B water quality standards are found in Minnesota Rules part 7050.0224, subpart 3.
- (10) Class 5 water quality standards are found in Minnesota Rules part 7050.0225, subpart 2.
- (11) Within these columns, **pink shading** indicates an exceedance of the applicable Class 1B standard, **orange shading** indicates an exceedance of the applicable Class 2A standard, **bold text** indicates an exceedance of the applicable Class 2B standard, dashed border indicates an exceedance of the applicable Class 3B standard, underlined text indicates an exceedance of the applicable Class 3C standard, and *italicized text* indicates an exceedance of the applicable Class 4A standard.
- (12) Shall not exceed 126 organisms/100 mL as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms/100 mL. (This standard applies only between April 1 and October 31.)
- (13) The primary maximum contaminant level (MCL) for fluoride is 4.0 mg/L, and secondary drinking water standard for fluoride is 2.0 mg/L.
- (14) Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as permitted by the appropriate authority having control over their use.
- (15) Applicable to water used for production of wild rice during periods when the rice may be susceptible to damage by high sulfate levels.
- (16) 5°F above natural in streams, based on monthly average of the maximum daily temperatures, except in no case shall it exceed the daily average temperature of 86°F.
- (17) TSS standards for Class 2A may be exceeded for no more than ten percent of the time. This standard applies only between April 1 and September 30.
- (18) None at levels harmful either directly or indirectly
- (19) Class 2A and Class 2B water quality standards for cadmium, chromium +3, copper, lead, nickel, silver, and zinc are hardness dependent. Values listed here for a total hardness of 400 mg/L.
- (20) The chronic standard for pentachlorophenol varies with pH and is calculated with an equation. For waters with pH values greater than 6.95, the CS shall not exceed the human health-based standard of 5.5 µg/L.

**Large Table 4 Class 2A Water Quality Standards and Data Comparison**

Constituent	Units	Minnesota Surface Water Quality Standards <sup>(1)</sup>	Minntac Monitoring Location D-1A			MPCA Monitoring Location SD004-874 <sup>(5)</sup>			MPCA Monitoring Location 99NF120		
		Class 2A <sup>(2)</sup>	Year	Summer Average <sup>(3)</sup> <sub>(4)</sub>	Number of Samples	Year	Summer Average <sup>(3) (4)</sup>	Number of Samples	Year	Summer Average <sup>(3) (4)</sup>	Number of Samples
Biochemical oxygen demand (BOD <sub>5</sub> )	mg/L	1.5	2018	1.07	3	n/a	n/a	n/a	n/a	n/a	n/a
Chlorophyll-a (seston)	µg/L	7	2018	1.4	3	2008	1.14	4	n/a	n/a	n/a
Chlorophyll-a (periphyton) <sup>(6)</sup>	mg/m <sup>2</sup>	150	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Diel dissolved oxygen flux	mg/L	less than or equal to 3	2018	4.0	continuous logger (mid-July - mid-August)	n/a	n/a	n/a	n/a	n/a	n/a
pH	SU	6.5 to 8.5	2012	7.7	2	n/a	n/a	n/a	2008	7.33	2
			2013	7.8	1						
			2014	8	1						
			2018	8.07	6						
Phosphorus, Total	µg/L	50	2012	20	2	2008	20.8	9	2008	52.5	2
			2013	<50	1						
			2018	23	3						
Nitrogen, Total	mg/L	Narrative	2018	0.014	5	2008	0.56	9	2008	<0.05	2
Secchi disk transparency	cm	Narrative	n/a	n/a	n/a	2008	> 100	9	n/a	n/a	n/a
						2009	67.4	8			
						2010	> 100	1			

(1) Per Minnesota Rules, part 7050.0410 and part 7050.0470, subpart 2.A(10), Dark River is designated as Class 1B, 2A, 3B, 3C, 4A, 4B, 5, and 6. Dark River is also a designated trout stream per Minnesota Rules part 6264.0050, subpart 4.PP(24).

(2) Class 2A water quality standards are found in Minnesota Rules, 7050.0222, subpart 2.

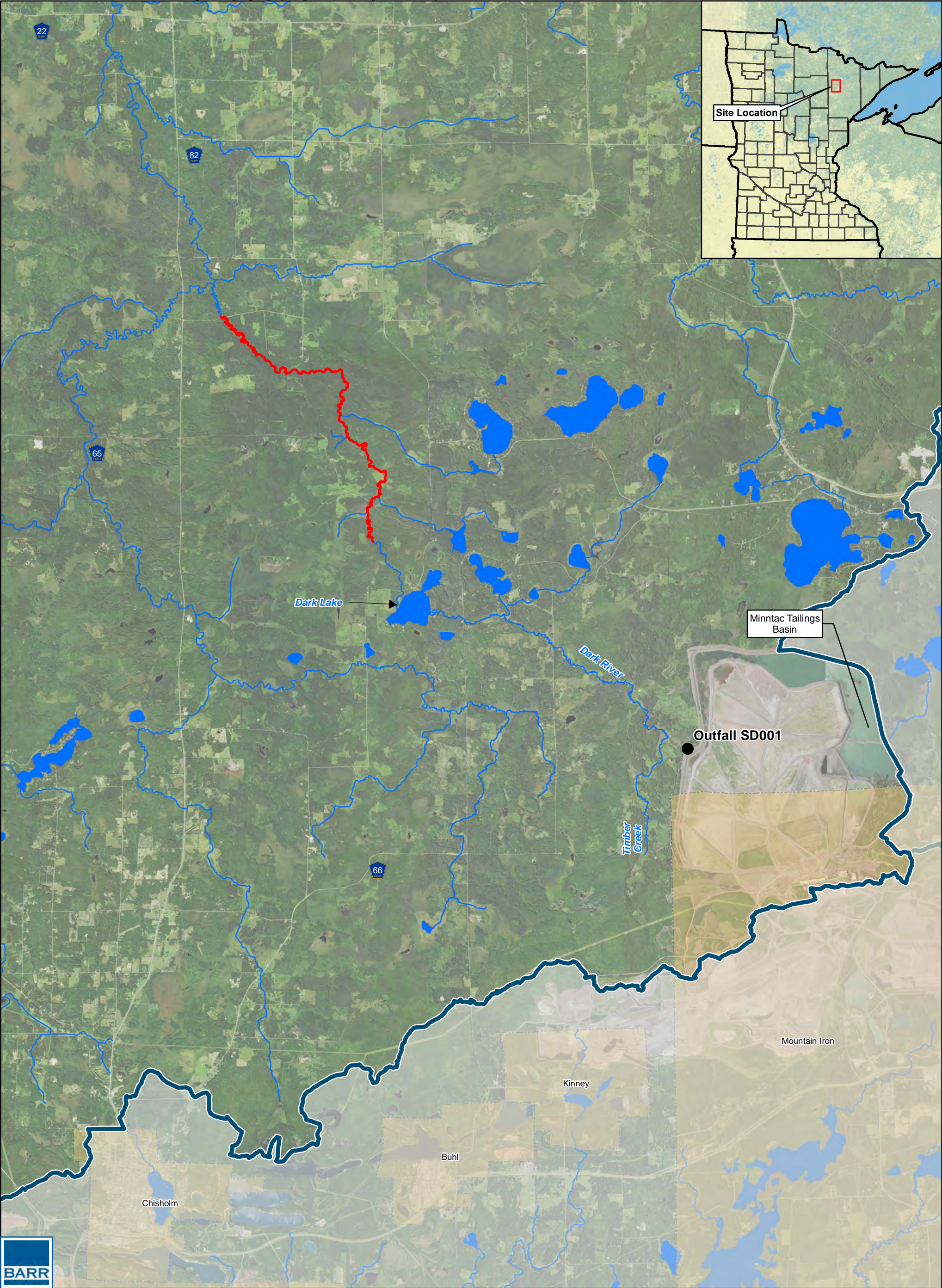
(3) Average calculated with non-detect samples at half the report limit.

(4) Summer-average is calculated consistent with Minnesota Rules, part 7050.0150, subpart 4.(II.), whereby a summer-average is “*representative average of concentrations or measurements of nutrient enrichment factors, taken over one summer season.*” and summer season “*means a period annually from June 1 through September 30.*”

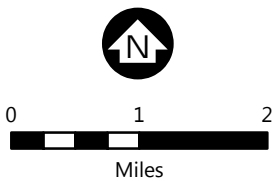
(5) Monitoring station S004-874 is managed by the MPCA and is located downstream of D-1A at CR 688. This monitoring location appears to be at the same location as 99NF120 as discussed in Section 5 (source: <https://cf.pca.state.mn.us/eda/stationInfo.php?ID=S004-874&ORG=MNP&wdip=2>).

(6) For chlorophyll-a (periphyton), the standard is exceeded if concentrations exceed 150 mg/m<sup>2</sup> more than one year in ten (Minnesota Rules, part 7050.0222, subpart 2b. C).

## Large Figures

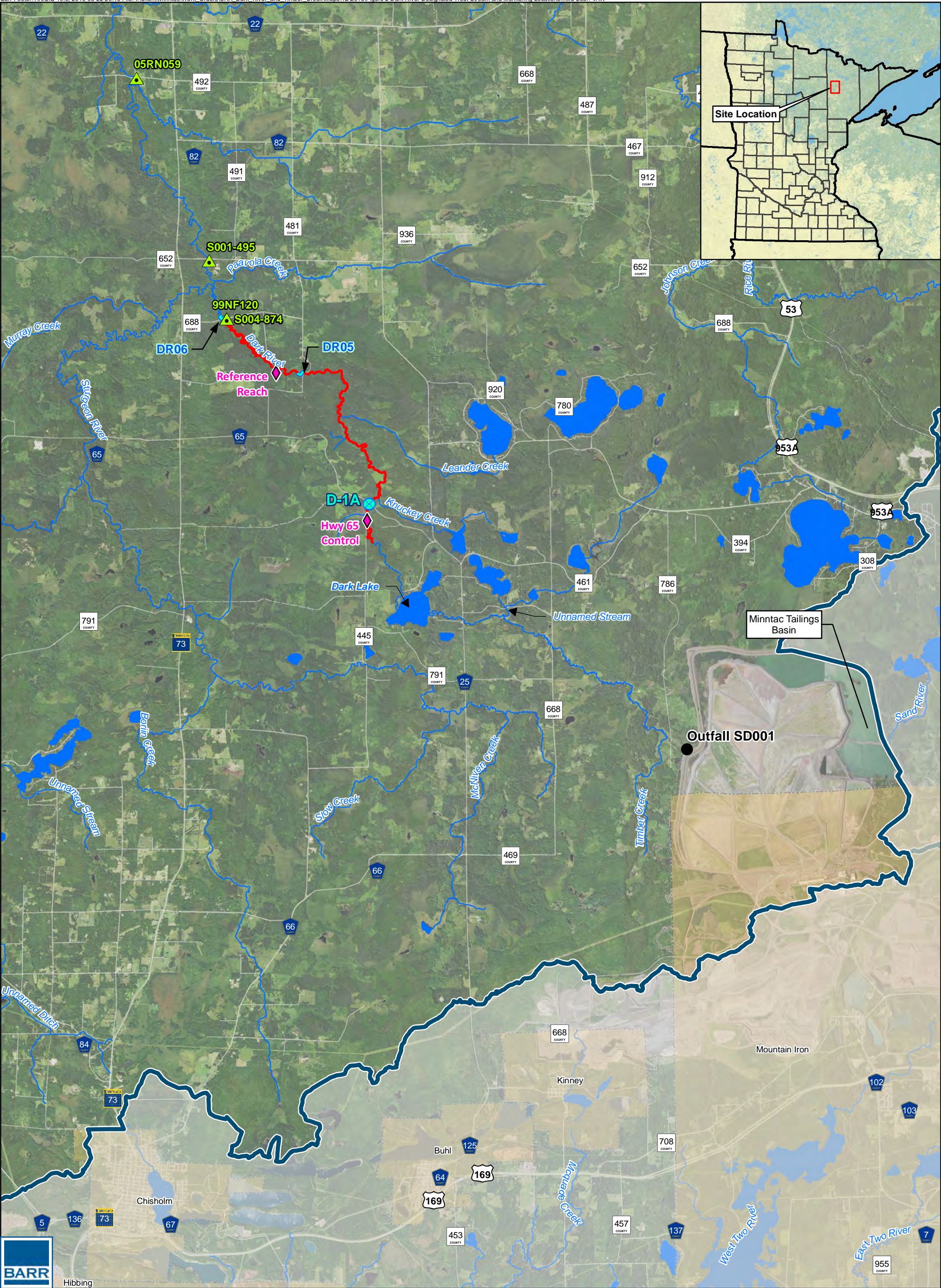


- Outfall SD001
- Dark River Designated Trout Stream
- Public Water Inventory Watercourse
- Major Watershed Boundary
- Municipal Boundary
- County Boundary



DARK RIVER DESIGNATED  
TROUT STREAM LOCATION  
U.S. Steel Minntac  
Saint Louis County, Minnesota

Large Figure 1



● Outfall SD001

◆ DNR Survey Locations

▲ MPCA Biological Monitoring Station

⊗ Minntac Water Quality Monitoring Location

— Minntac Biological Monitoring Location

— Dark River Designated Trout Stream

— Public Water Inventory Watercourse

Major Watershed Boundary

Municipal Boundary

County Boundary

0 1 2

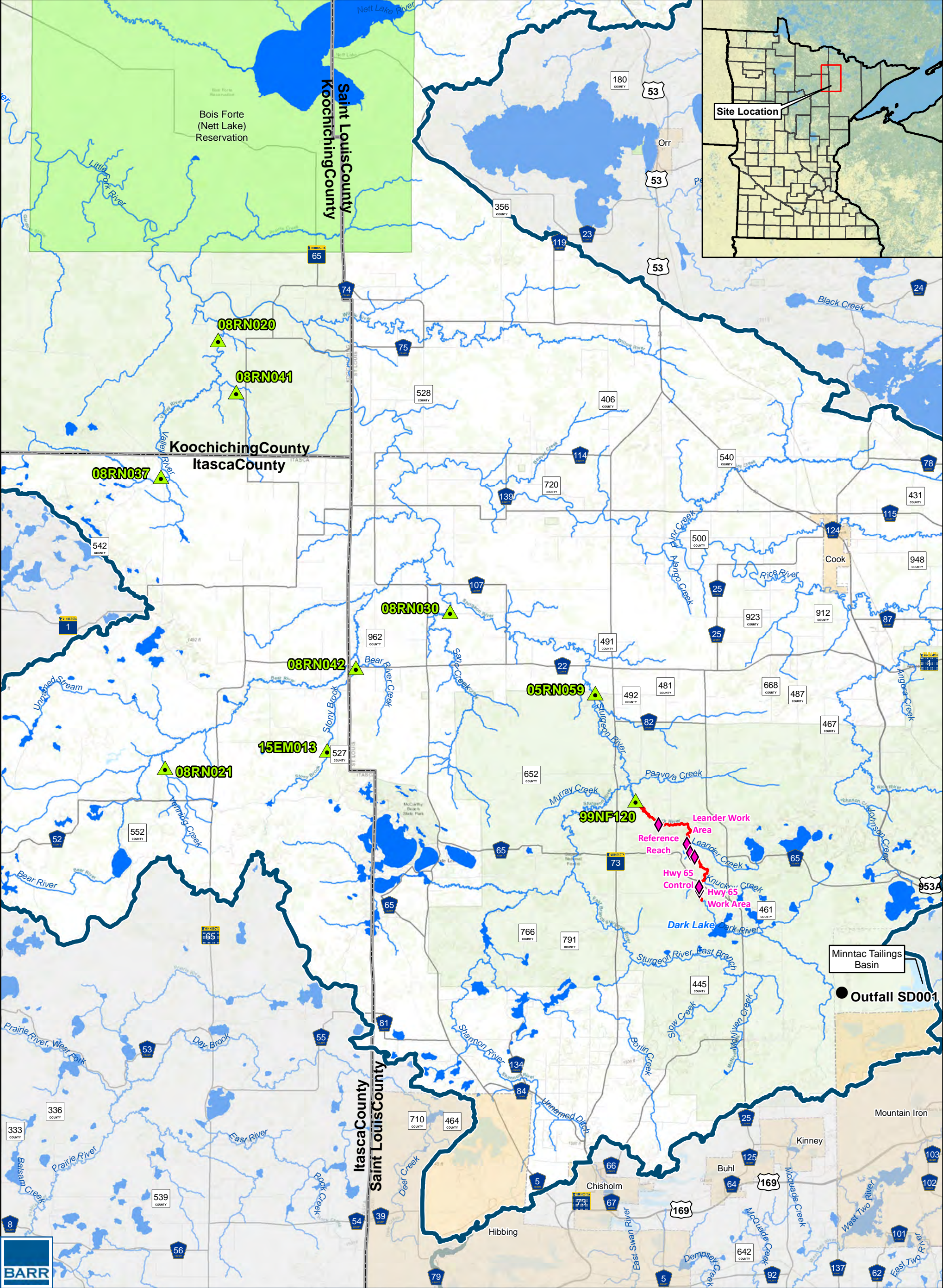
Miles

DARK RIVER DESIGNATED TROUT STREAM LOCATION & MONITORING STATIONS

U.S. Steel Minntac

Saint Louis County, Minnesota

Large Figure 2



●

Outfall SD001

◆

DNR Survey Locations

▲

MPCA Biological Monitoring Station

Dark River Designated Trout Stream

Public Water Inventory Watercourse

Major Watershed Boundary

Native American Reservation

Municipal Boundary

County Boundary

N

0

4

8

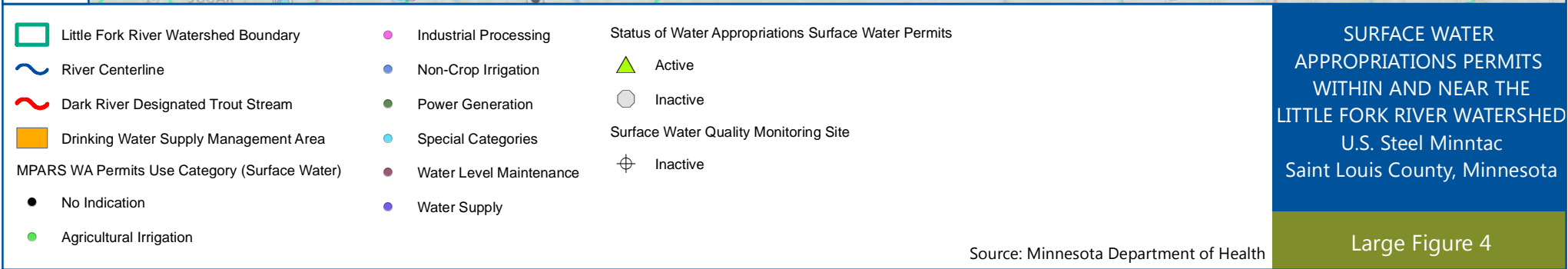
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REFERENCE MONITORING STATIONS

U.S. Steel Minntac

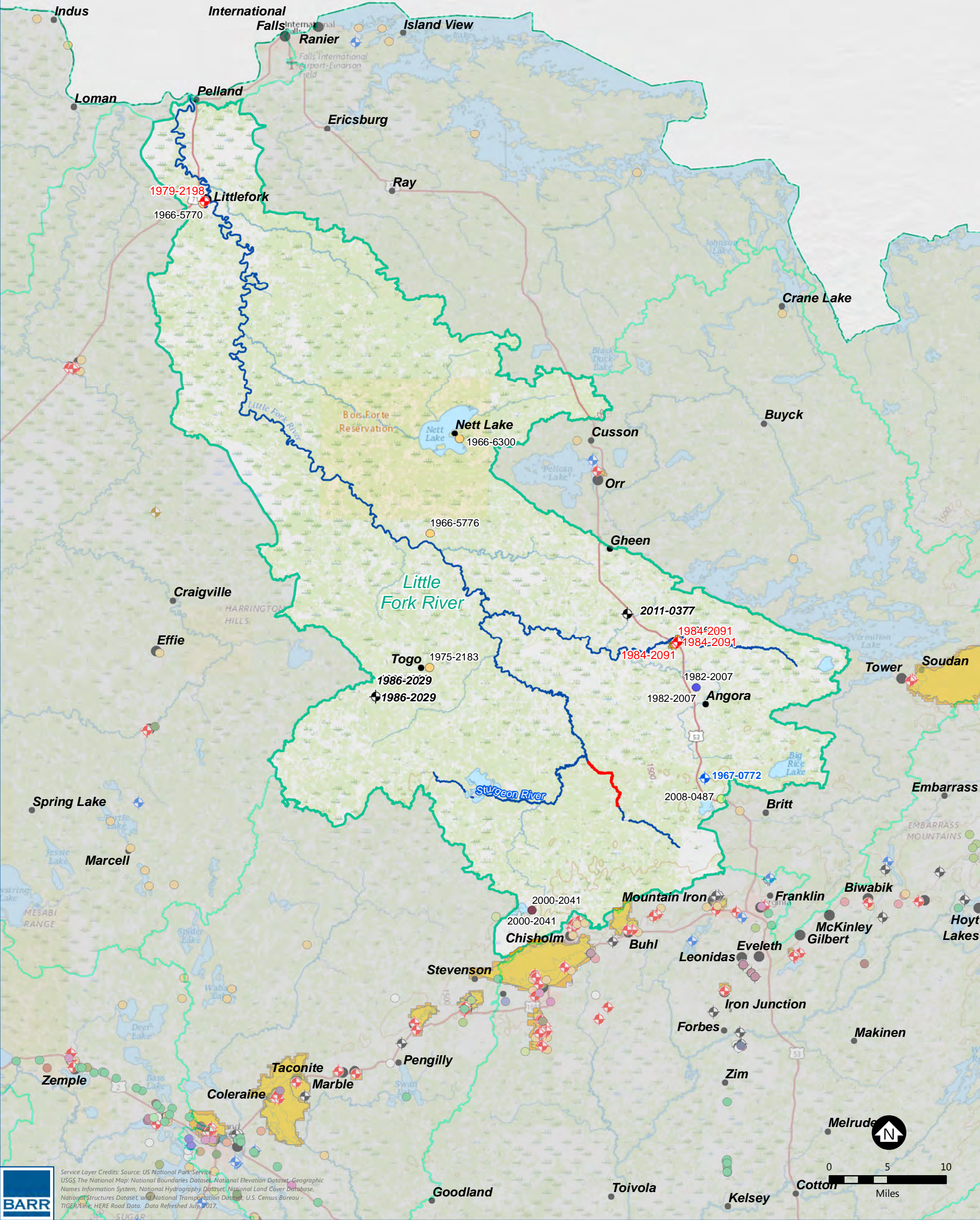
Saint Louis County, Minnesota

Large Figure 3



SURFACE WATER  
APPROPRIATIONS PERMITS  
WITHIN AND NEAR THE  
LITTLE FORK RIVER WATERSHED  
U.S. Steel Minntac  
Saint Louis County, Minnesota

Large Figure 4

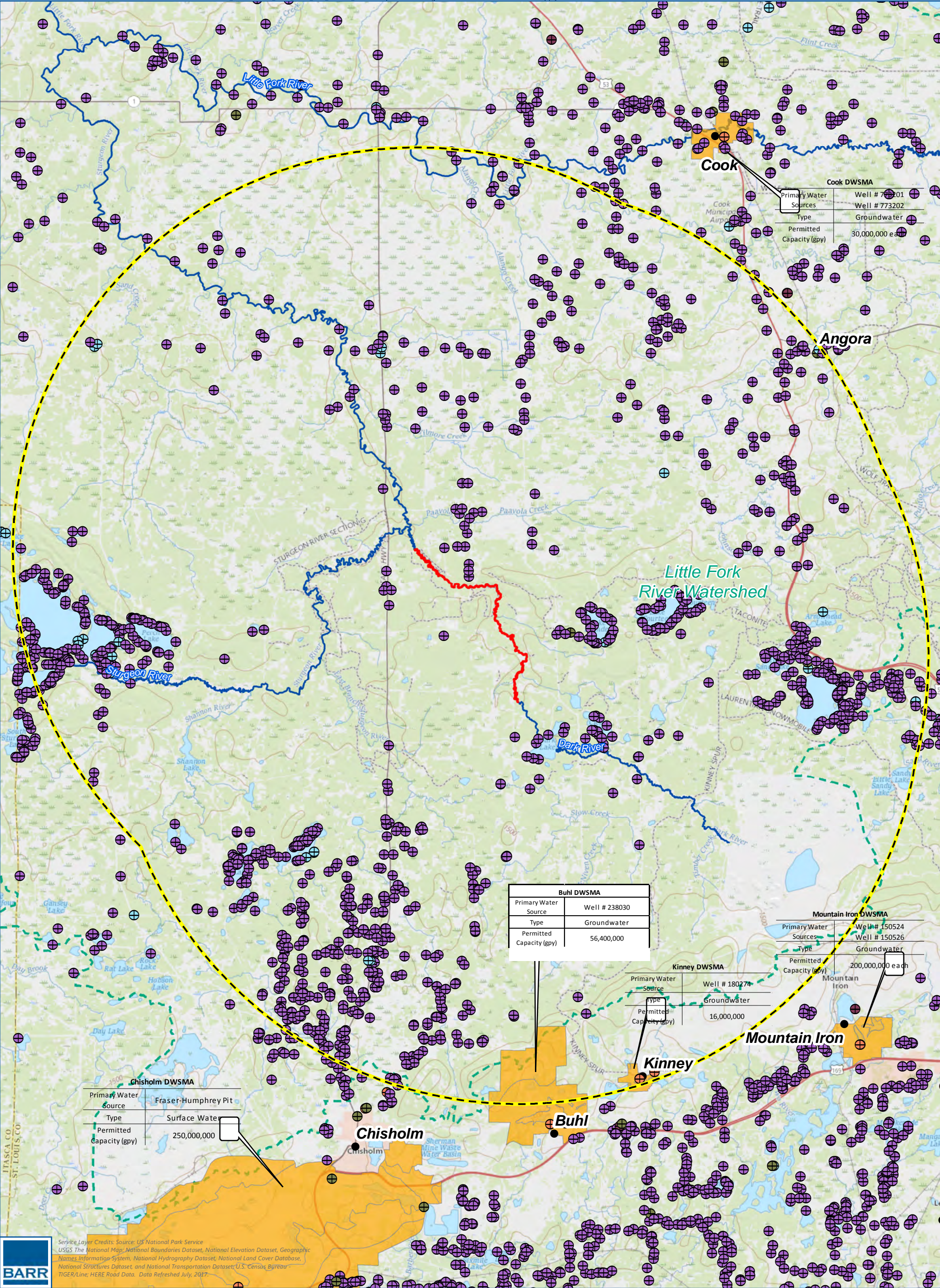


Little Fork River Watershed Boundary	River Centerline	Dark River Designated Trout Stream	Drinking Water Supply Management Area	Wellhead Protection Area
No Value	Agricultural Crop Irrigation	Aquaculture	Basin (Lake) Level Maintenance	Groundwater Dewatering
Campground/Wayside/... Rest Area Water Supply	Commercial/Institutional Water Supply	Construction Dewatering	Fire Protection Water Supply	Golf Course Irrigation
Landscaping/Athletic Field Irrigation	Mine Processing (excludes sand/gravel)	Municipal/Public Water Supply	Nursery Irrigation	Once-through Systems (HVAC)
Other Industrial Processing	Other Non-Crop Irrigation	Other Power Generation	Other Temporary	Other Water Supply
Private Water Supply	Sand and Gravel Washing	Thermoelectric Power Cooling - Once Through	Wild Rice Irrigation	Wood Products Processing
Pipeline and Tank Testing	Pollution Containment			

**GROUNDWATER WATER APPROPRIATIONS PERMITS WITHIN AND NEAR THE LITTLE FORK RIVER WATERSHED**  
U.S. Steel Minntac  
Saint Louis County, Minnesota

Large Figure 5

Source: Minnesota Department of Health



10 Mile Radius

Little Fork River Watershed Boundary

River Centerline

Dark River Designated Trout Stream

Well - County Well Index

Domestic Well

Community Supply (Municipal)

Public Supply/Non-community-transient

Public Supply/Non-community-non-transient

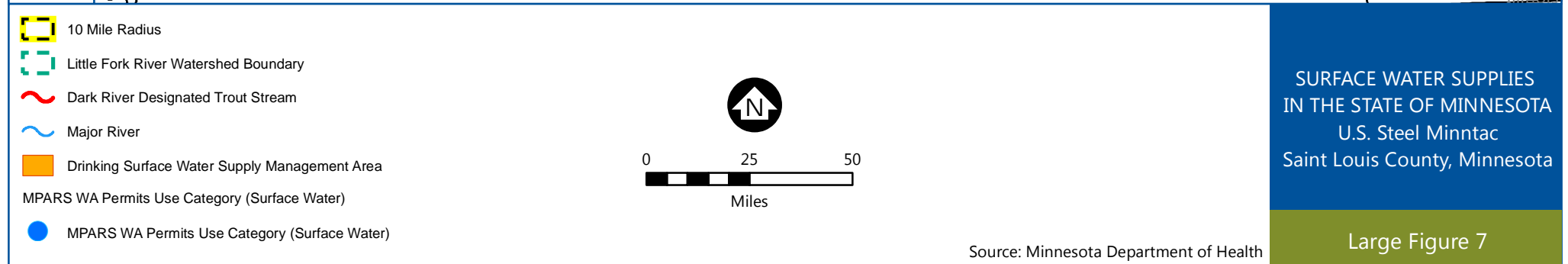
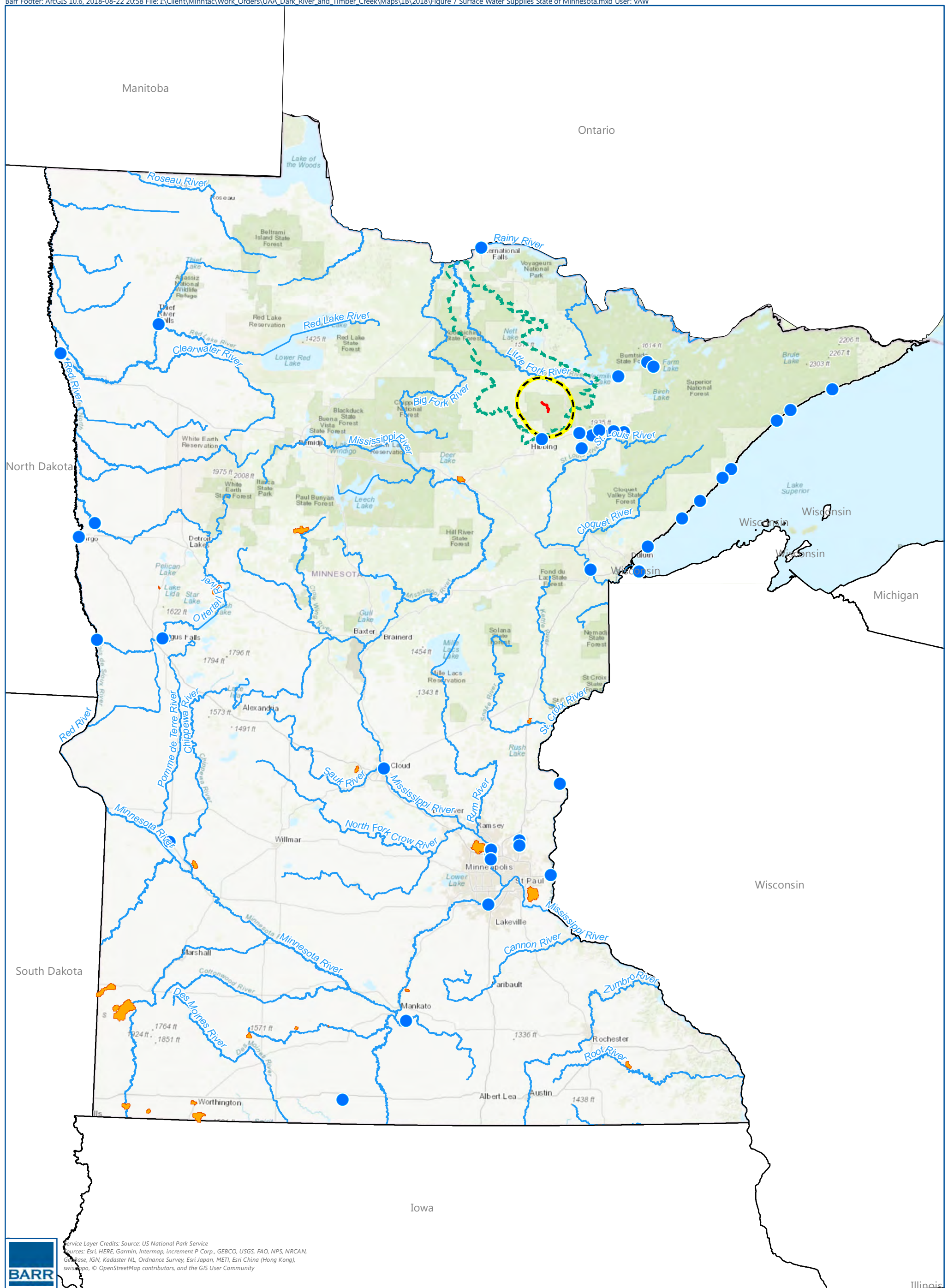
Public Supply/Non-community

Drinking Water Supply Management Area

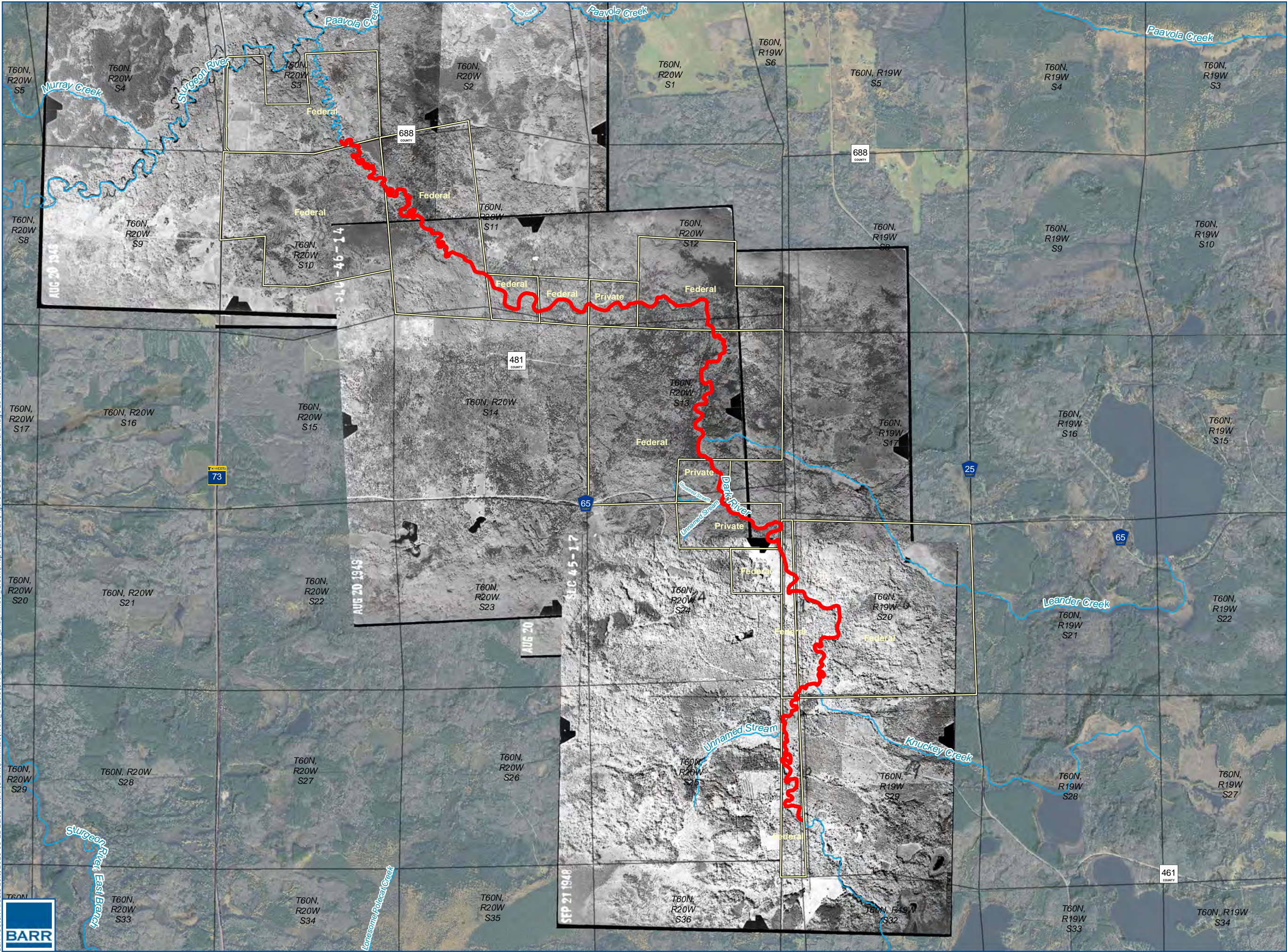
Source: Minnesota Department of Health

**PUBLIC AND PRIVATE WATER SUPPLY WELLS IN THE DARK RIVER SURROUNDING AREA**  
U.S. Steel Minntac  
Saint Louis County, Minnesota

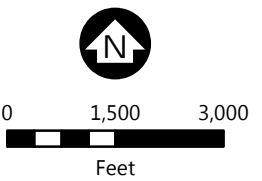
Large Figure 6



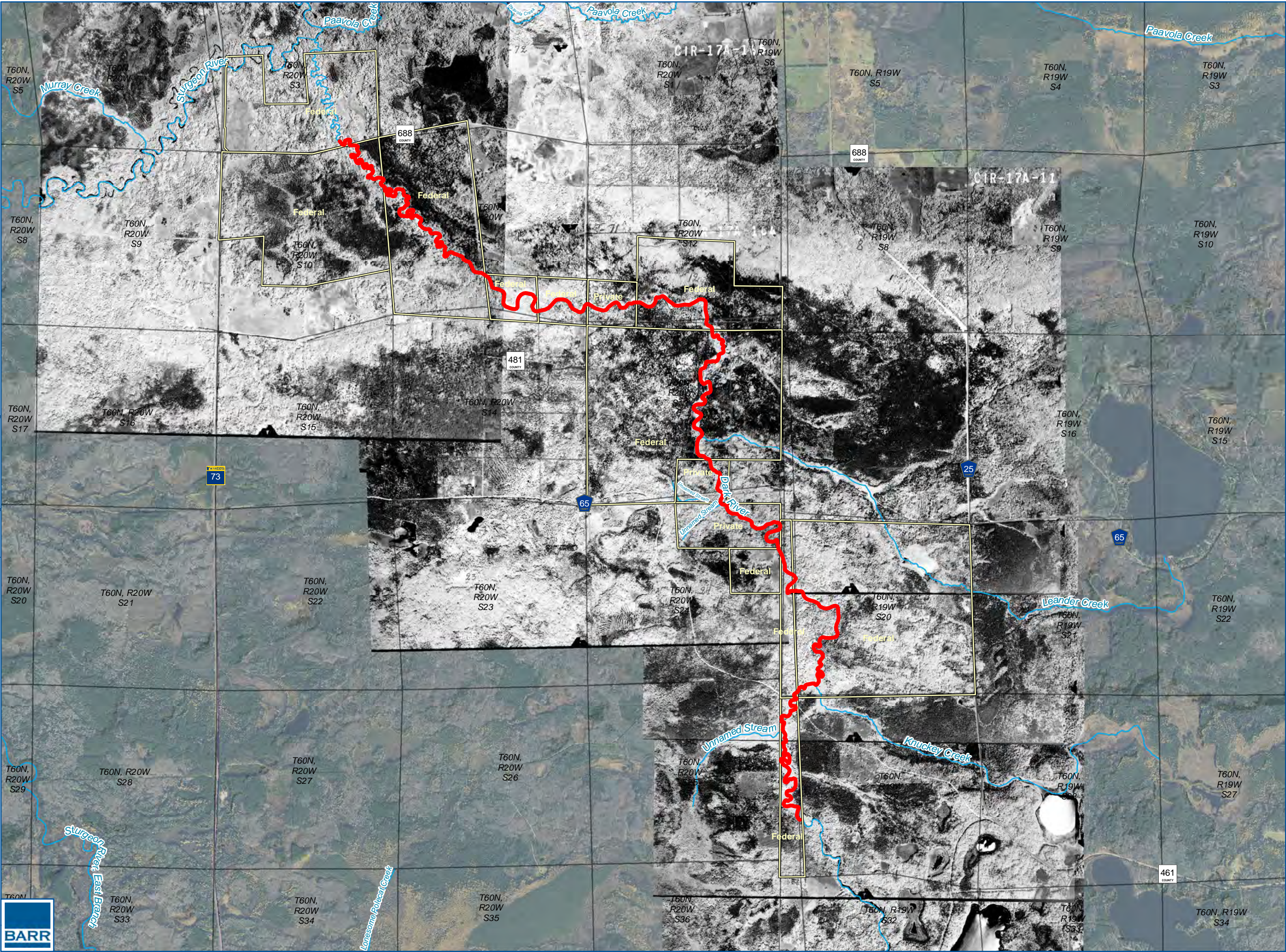
Barr Footer: ArcGIS 10.6, 2018-08-22 21:01 File: \\Client\Minntac\Work Orders\UAA Dark River and Timber Creek\Maps\1B\2018\Figure 8 Dark River Aerial Image 1949.mxd User: VAW






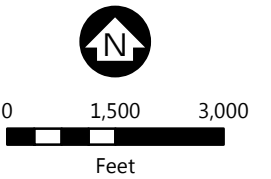
- Designated Trout Stream on Dark River
- Current Property Ownership
- Public Waters Inventory Watercourses

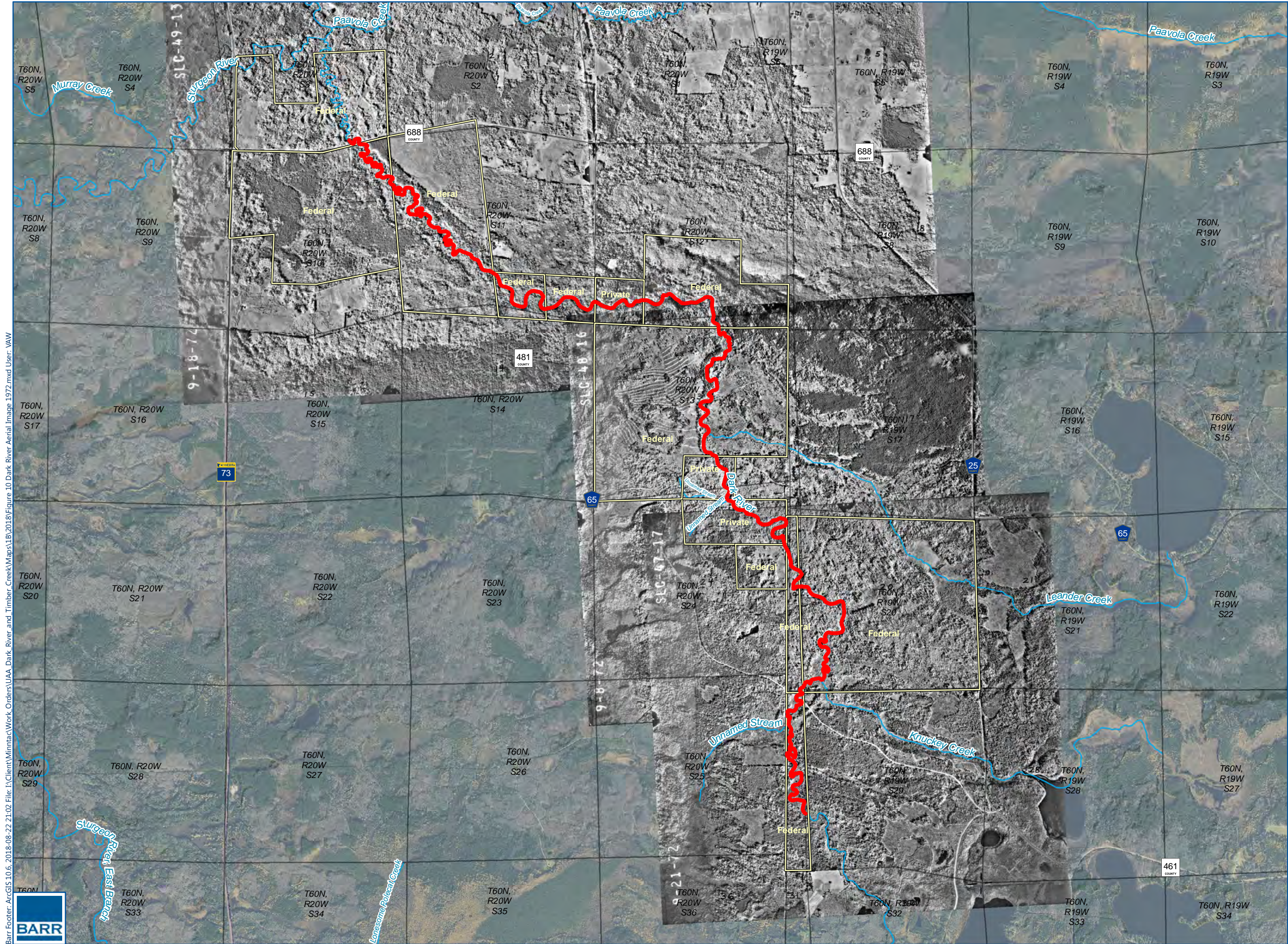





1949 AERIAL IMAGE  
U.S. Steel Minntac  
Saint Louis County, Minnesota  
Large Figure 8

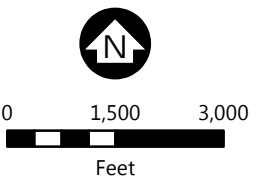


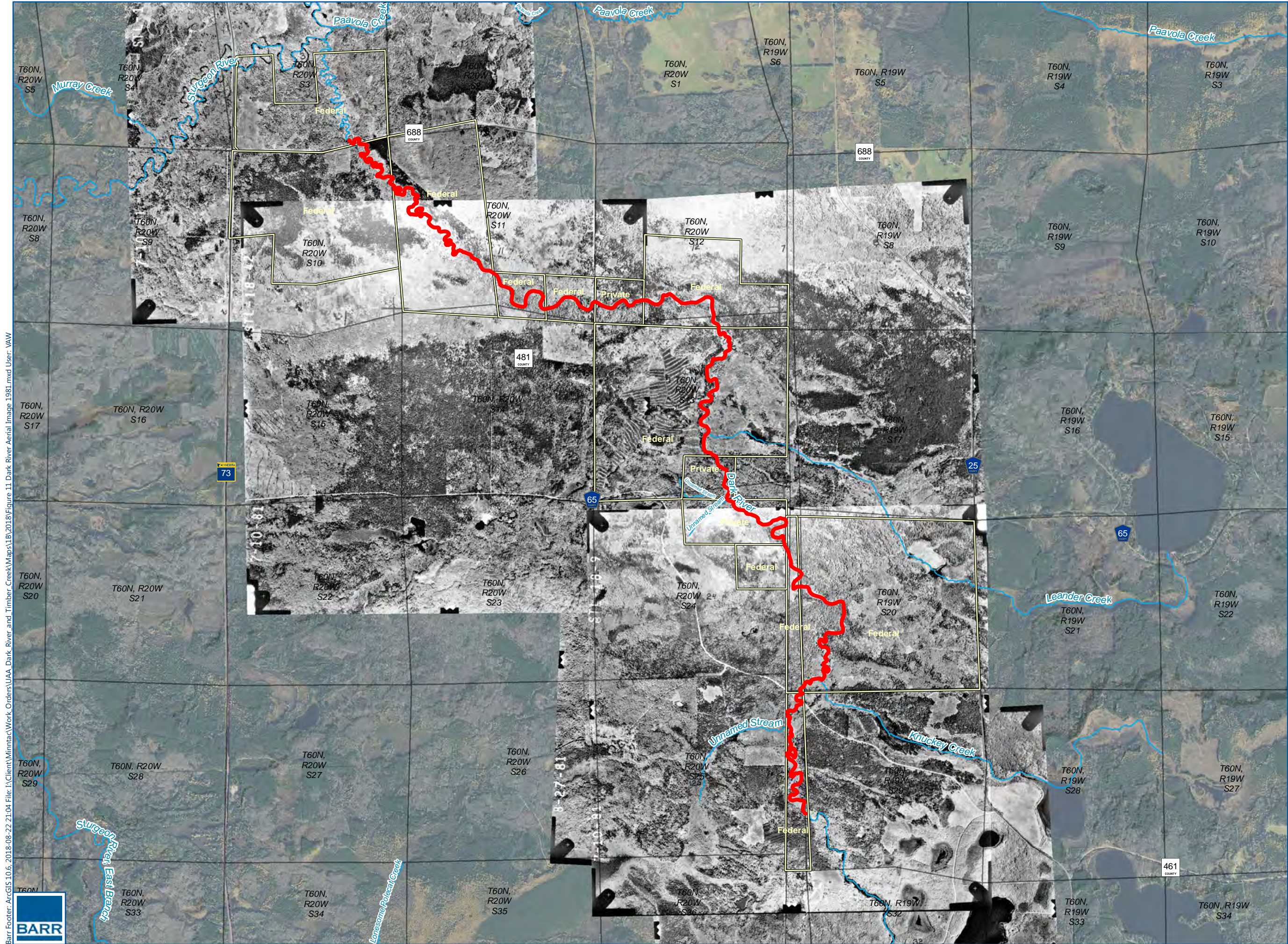
-  Designated Trout Stream on Dark River
-  Current Property Ownership
-  Public Waters Inventory Watercourses



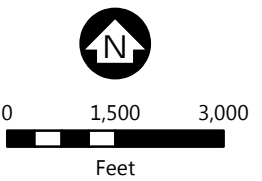


-  Designated Trout Stream on Dark River
-  Current Property Ownership
-  Public Waters Inventory Watercourses

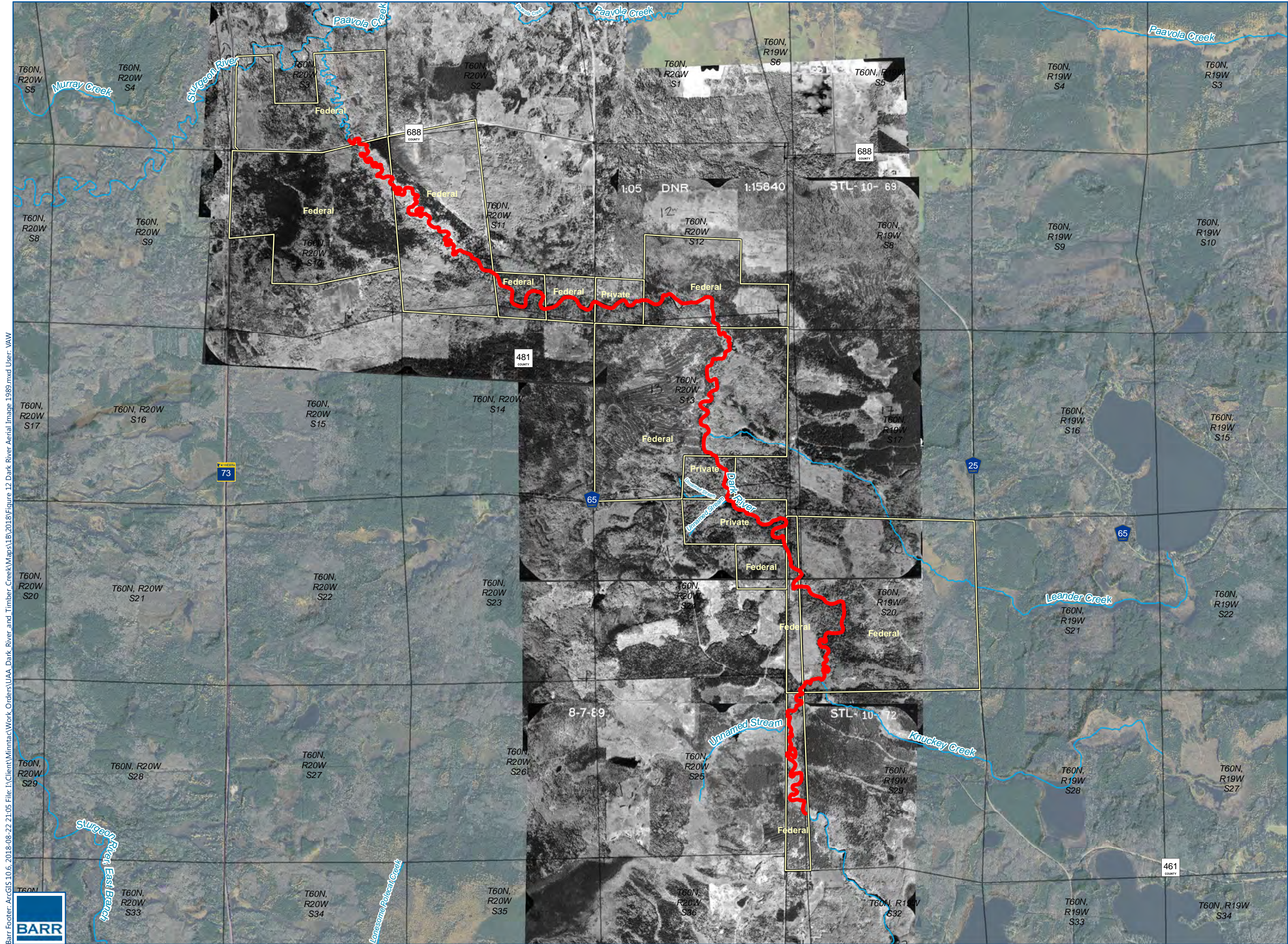







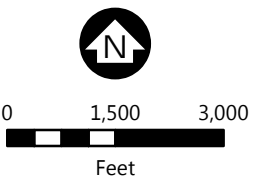
- Designated Trout Stream on Dark River
- Current Property Ownership
- Public Waters Inventory Watercourses



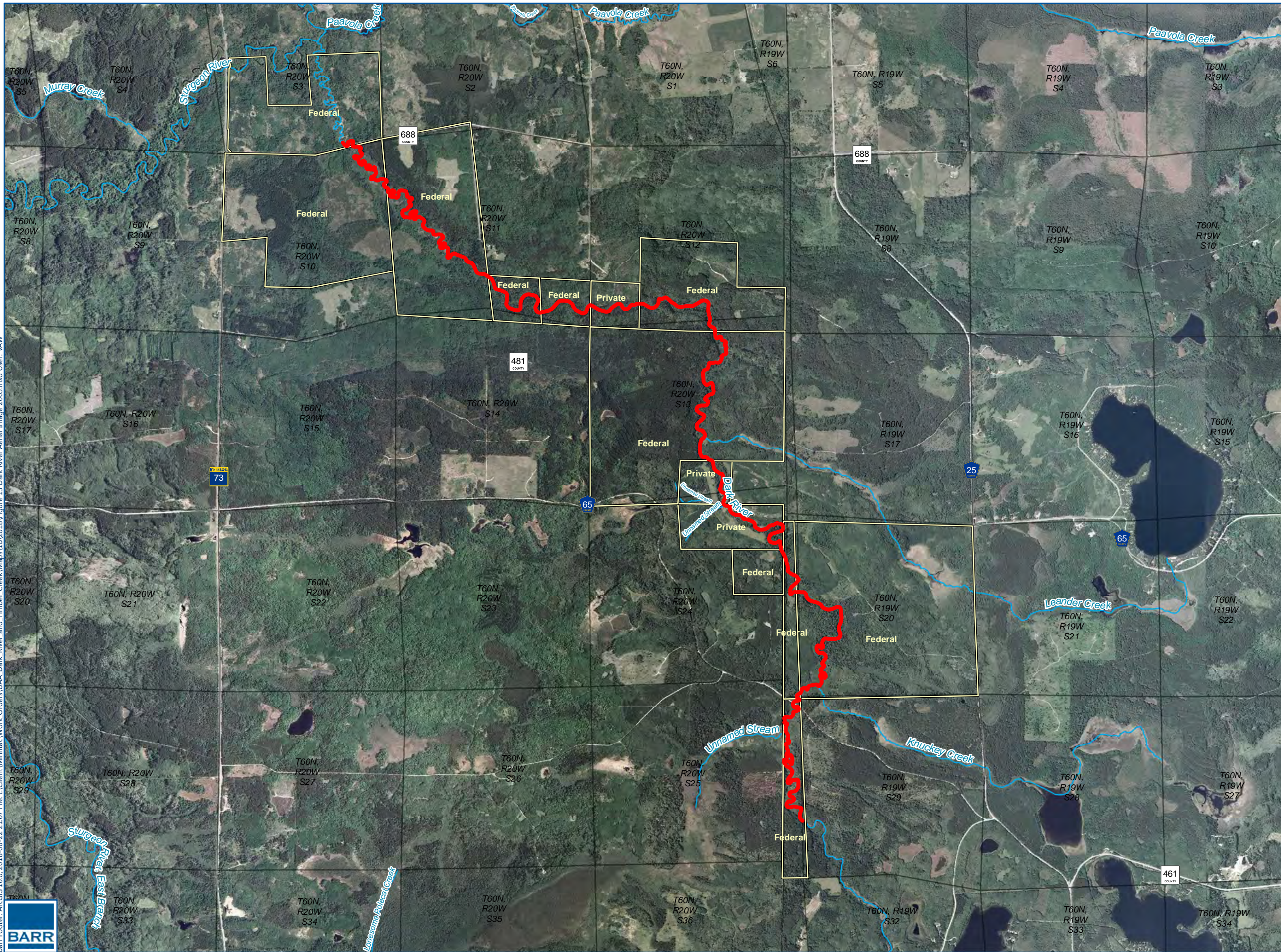
Barr Footer: ArcGIS 10.6, 2018-08-22 21:05 File: I:\Client\Minntac\Work Orders\UAA Dark River and Timber Creek\Maps\1B\2018\Figure 12 Dark River Aerial Image 1989.mxd User: VAW



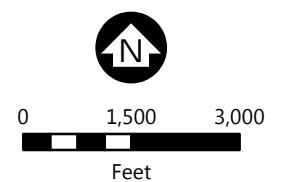
-  Designated Trout Stream on Dark River
-  Current Property Ownership
-  Public Waters Inventory Watercourses



Barr Footer: ArcGIS 10.6, 2018-08-22 21:07 File: I:\Client\Minntac\Work Orders\UAA Dark River and Timber Creek\Map\1B\2018\Figure 13 Dark River Aerial Image 2003.mxd User: VAW






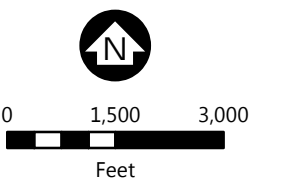
- Designated Trout Stream on Dark River
- Current Property Ownership
- Public Waters Inventory Watercourses



Barr Footer: ArcGIS 10.6, 2018-08-22 21:09 File: I:\Client\Minntac\Work Orders\UAA Dark River and Timber Creek\Maps\1B\2018\Figure 14 Dark River Aerial Image 2010.mxd User: VAW






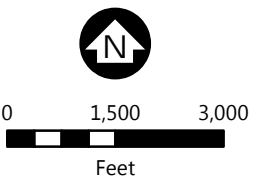
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-  Current Property Ownership
-  Public Waters Inventory Watercourses

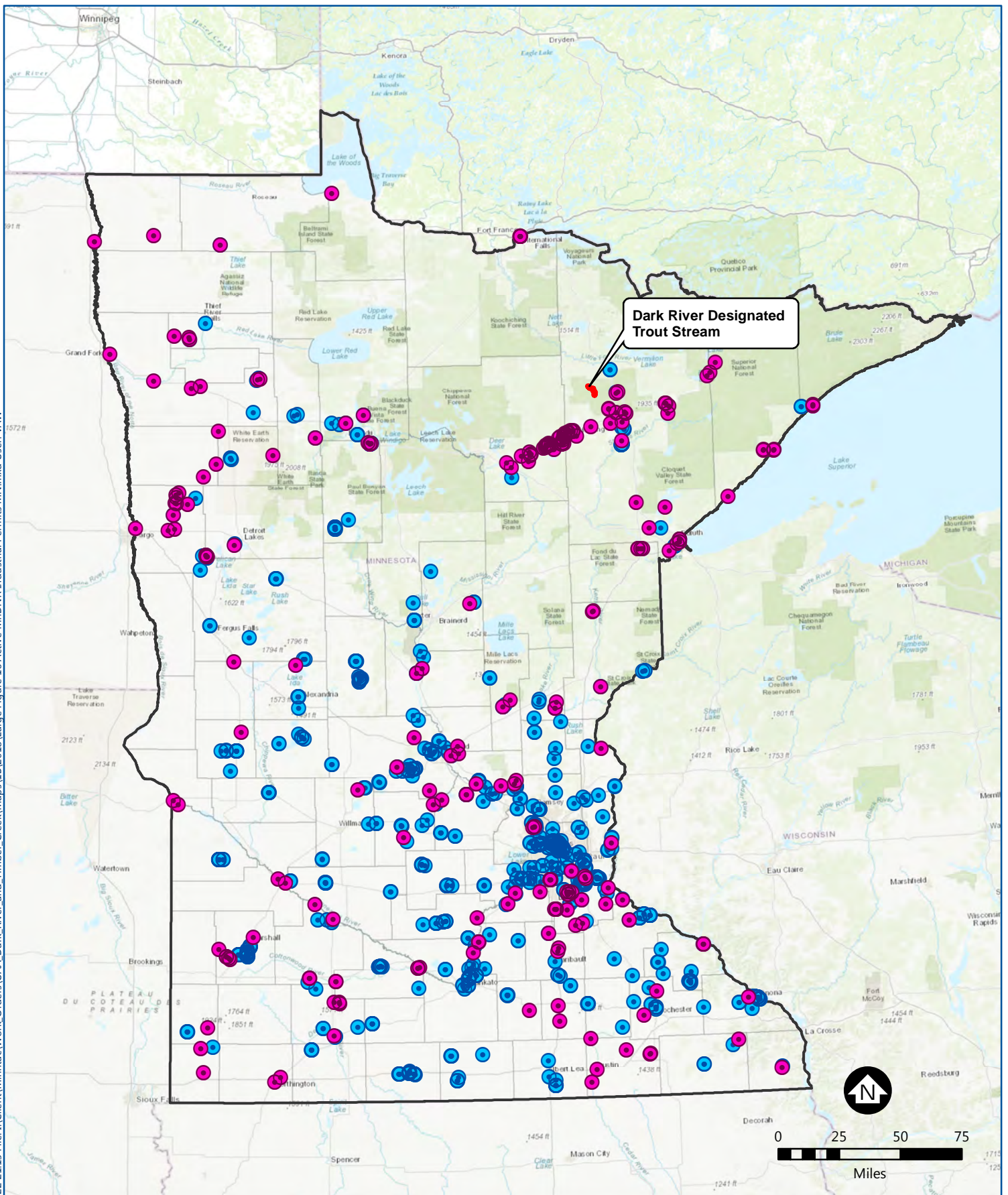


Barr Footer: ArcGIS 10.6, 2018-08-22 21:10 File: I:\Client\Minntac\Work Orders\UAA Dark River and Timber Creek\Maps\1B\2018\Figure 15 Dark River Aerial Image 2017.mxd User: VAW



-  Designated Trout Stream on Dark River
-  Current Property Ownership
-  Public Waters Inventory Watercourses





Industrial Related Processing  
(MPARS Data Obtained August  
2017)

Dark River Designated Trout  
Stream

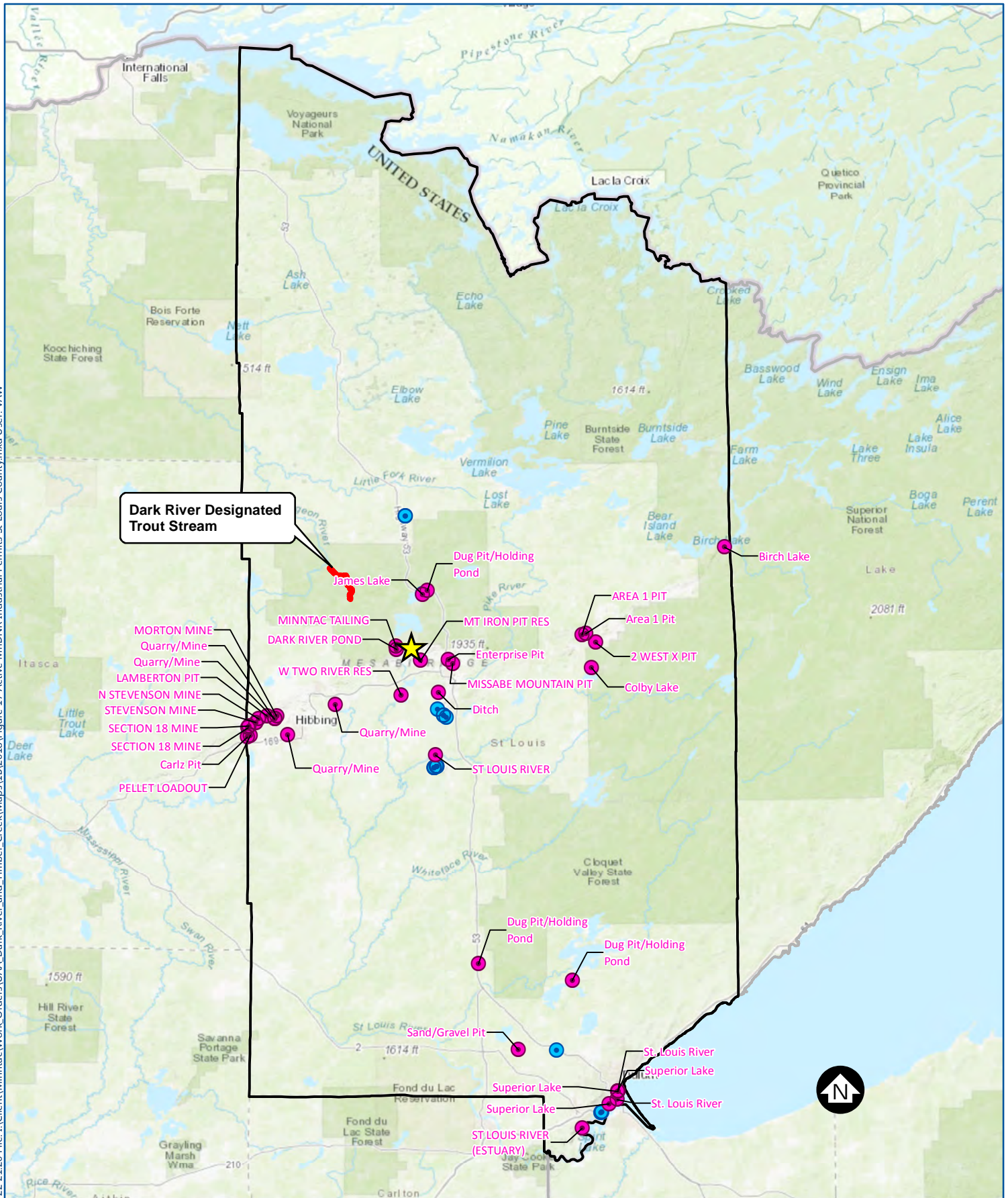
- Surface Water
- Groundwater

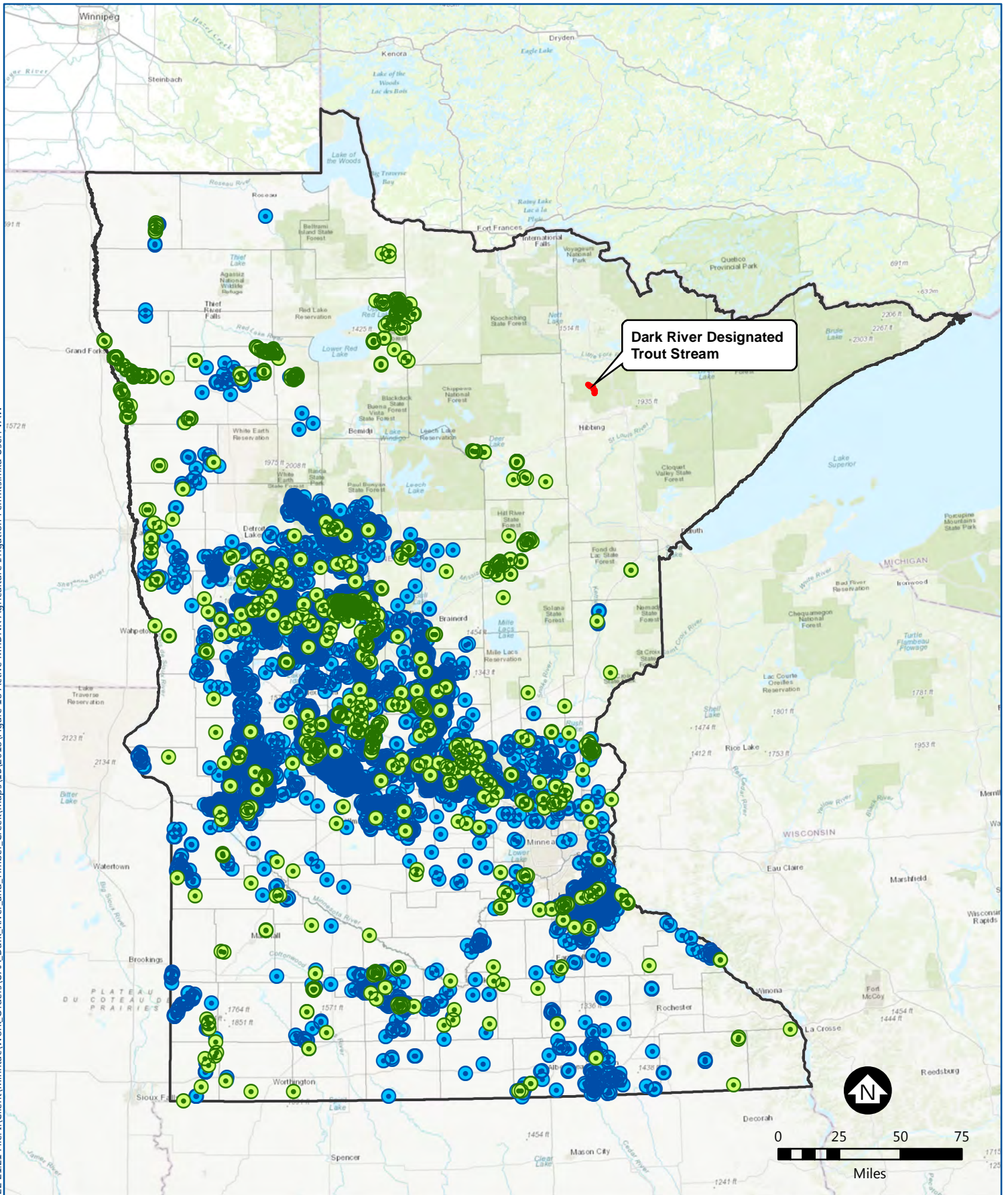
MINNESOTA ACTIVE MNDNR INDUSTRIAL  
PROCESS RELATED WATER APPROPRIATION  
PERMITS

U.S. Steel Minntac  
Saint Louis County, Minnesota

Large Figure 16







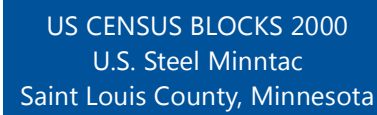
Agricultural Irrigation (MPARS  
Data Obtained August 2017)

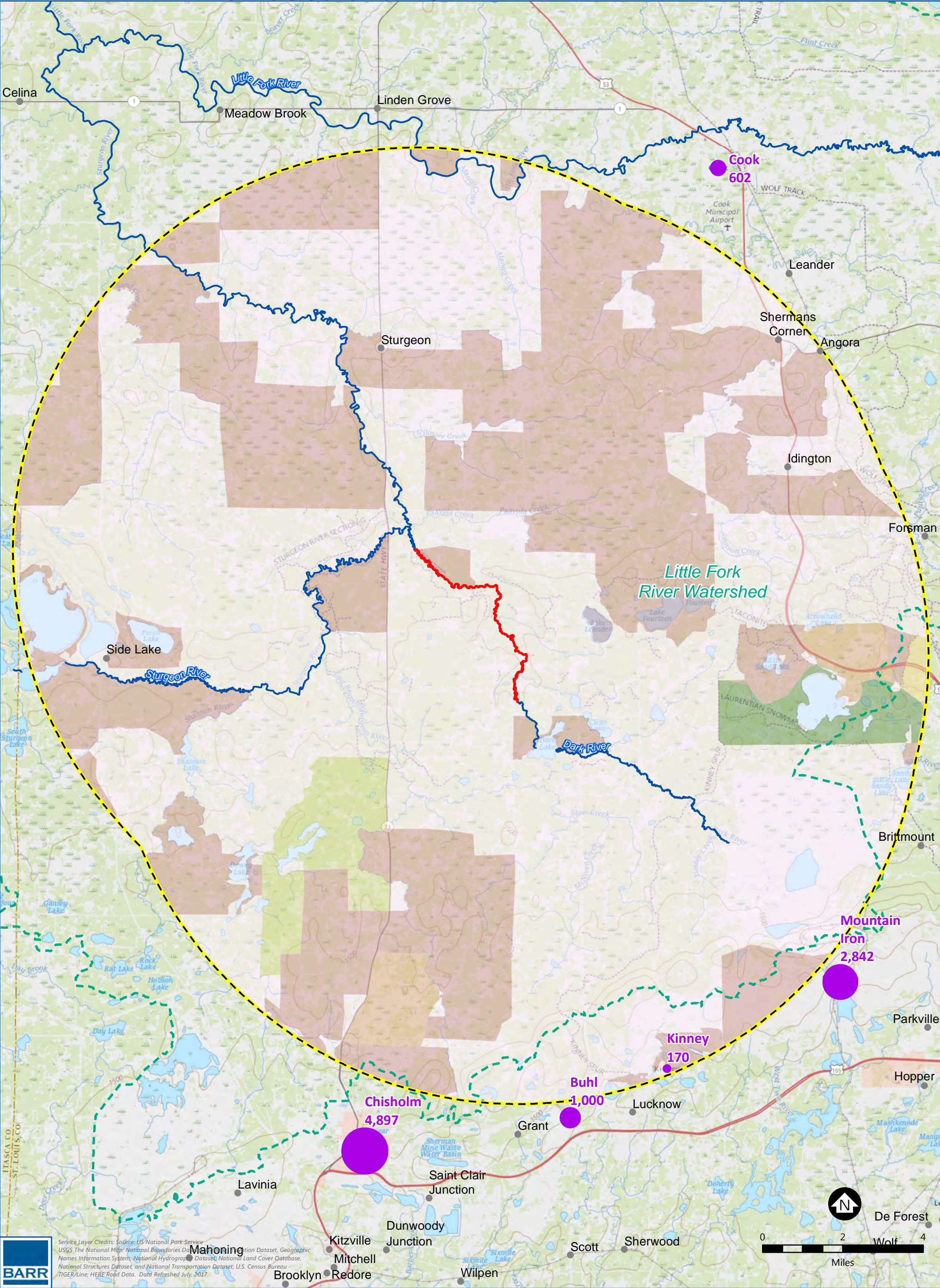
- Surface Water
- Groundwater

Dark River Designated Trout  
Stream

MINNESOTA  
ACTIVE MNDNR AGRICULTURAL IRRIGATION  
WATER APPROPRIATION PERMITS  
U.S. Steel Minntac  
Saint Louis County, Minnesota  
Large Figure 18

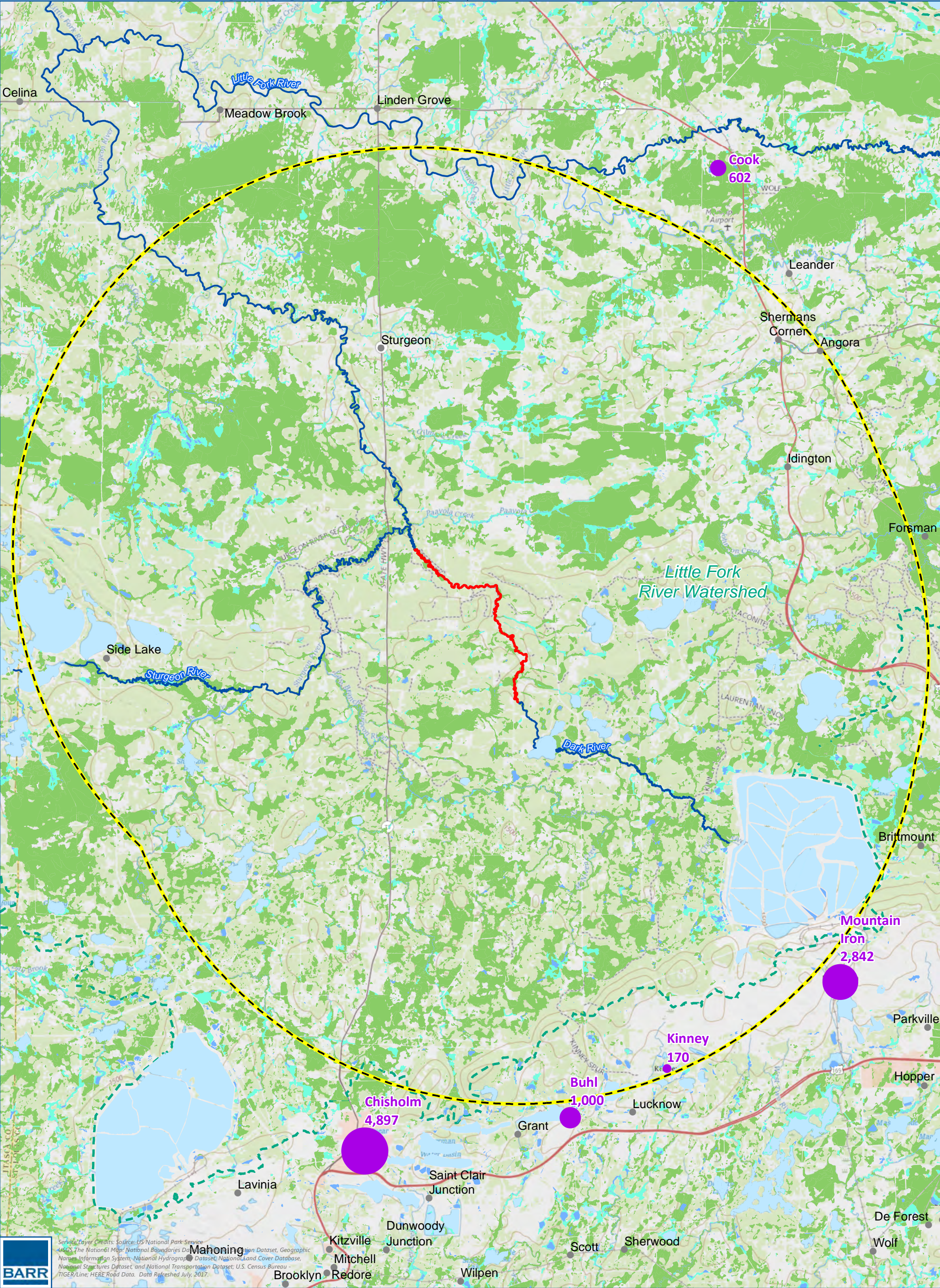






US CENSUS BLOCKS 2010  
U.S. Steel Minntac  
Saint Louis County, Minnesota

Large Figure 20



10 Mile Radius

Little Fork River Watershed Boundary

River Centerline

Dark River Designated Trout Stream

USGS Populated Place

US Census 2010 Populated City

100

500

1,000

Wetlands (MN DNR NWI Northeast Update)

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Riverine

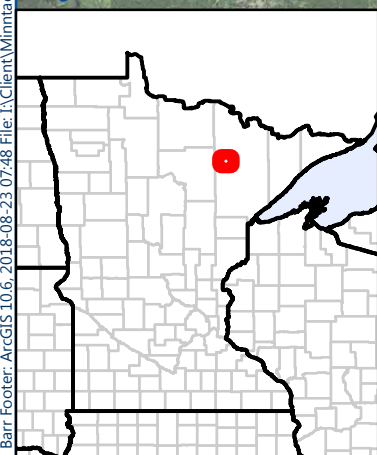
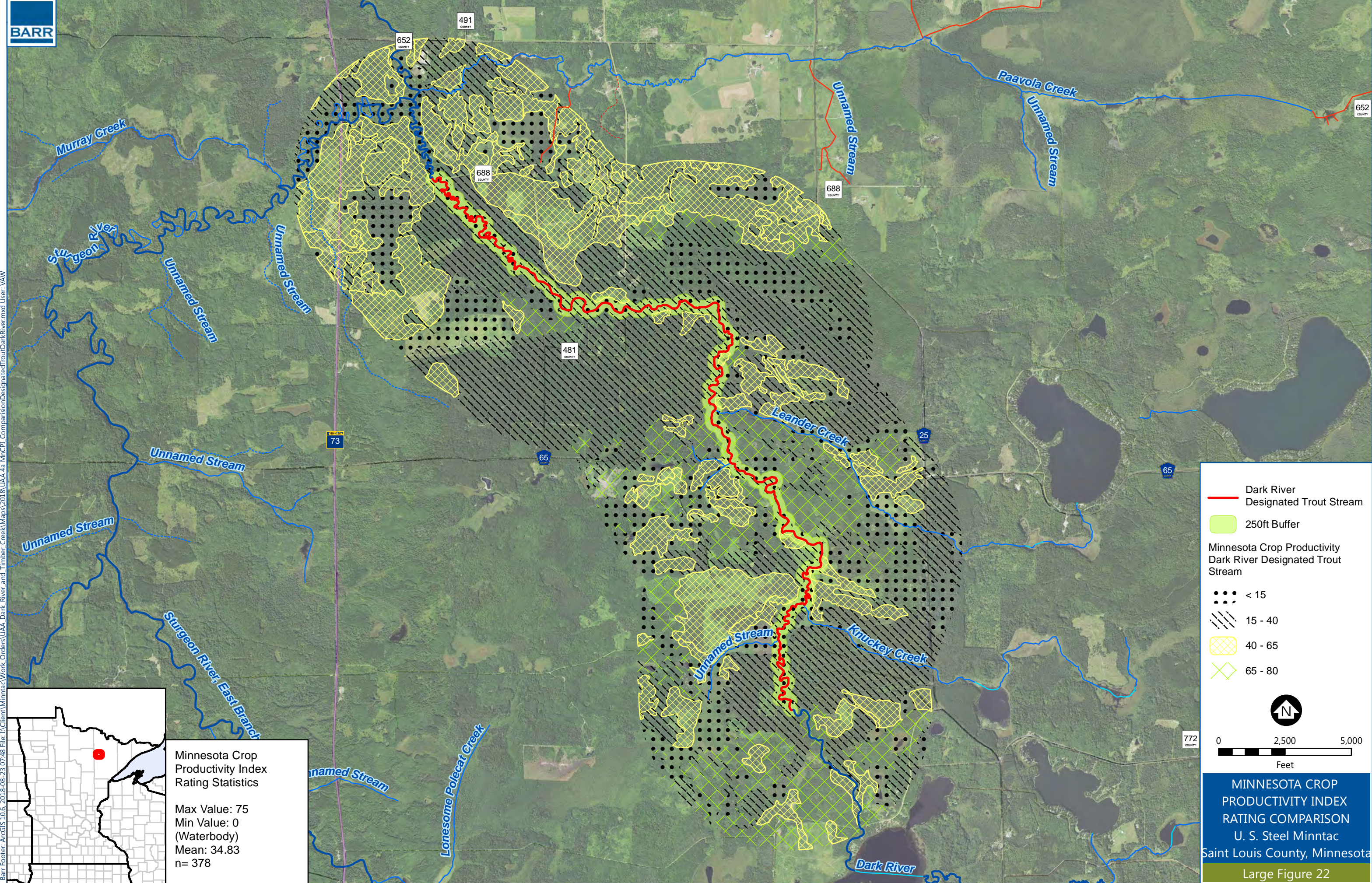
0 2 4 Miles

SURROUNDING WETLAND AND POPULATED AREAS  
U.S. Steel Minntac  
Saint Louis County, Minnesota

Large Figure 21



Barr Footer: ArcGIS 10.6, 2018-08-23 07:48 File: I:\Client\Minntac\Work Orders\UAA Dark River and Timber Creek\Maps\2018\UAA 4a MnCPI Comparison\DesignatedTroutDarkRiver.mxd User: VAW



Minnesota Crop Productivity Index Rating Statistics

Max Value: 75  
Min Value: 0 (Waterbody)  
Mean: 34.83  
n= 378

Dark River Designated Trout Stream

250ft Buffer

Minnesota Crop Productivity Dark River Designated Trout Stream

••• < 15

/// 15 - 40

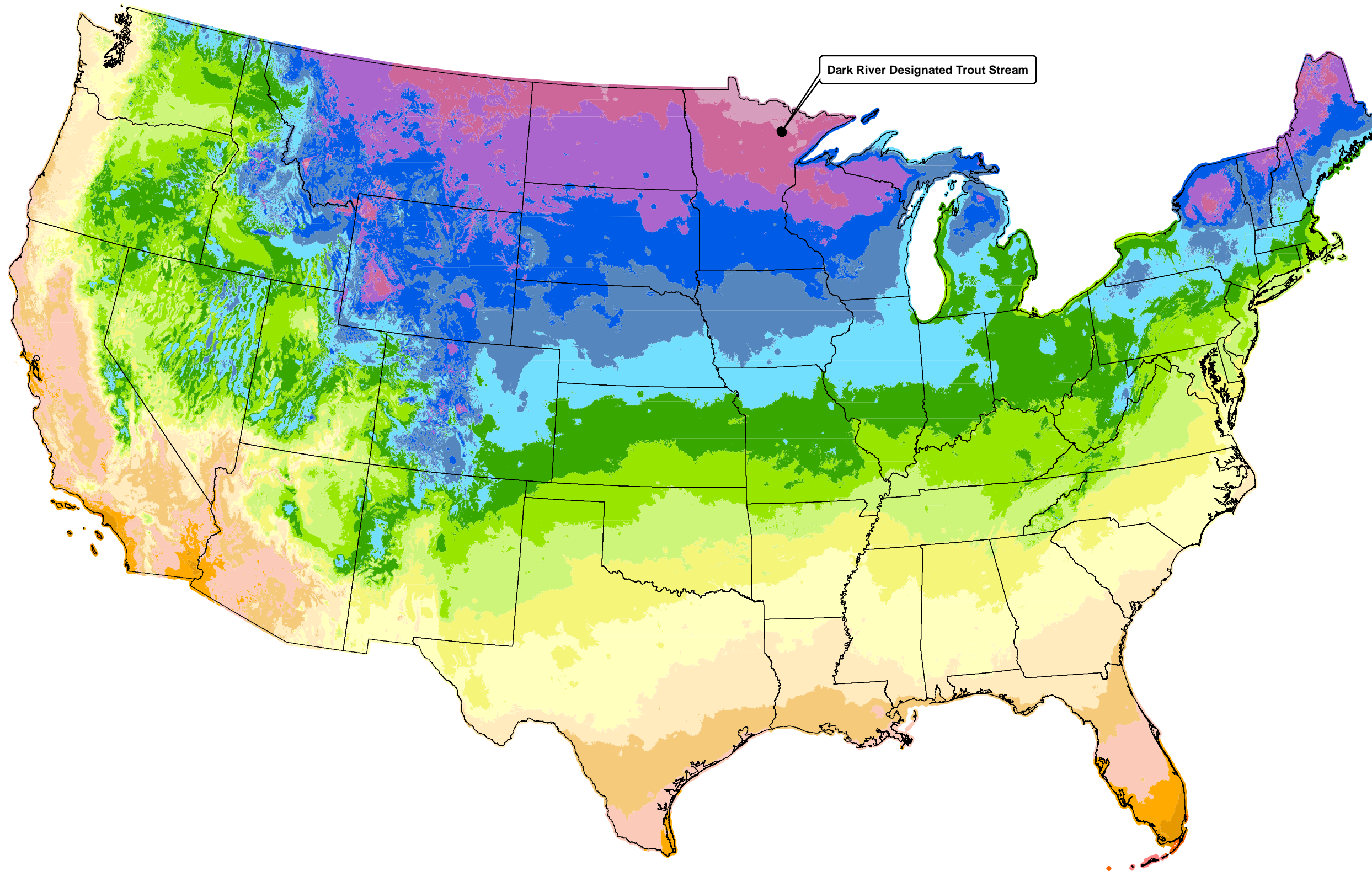
XXXX 40 - 65

XXXX 65 - 80

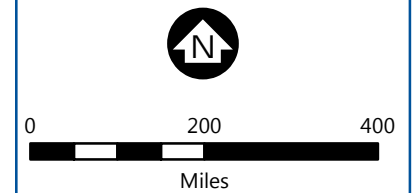
0 2,500 5,000 Feet

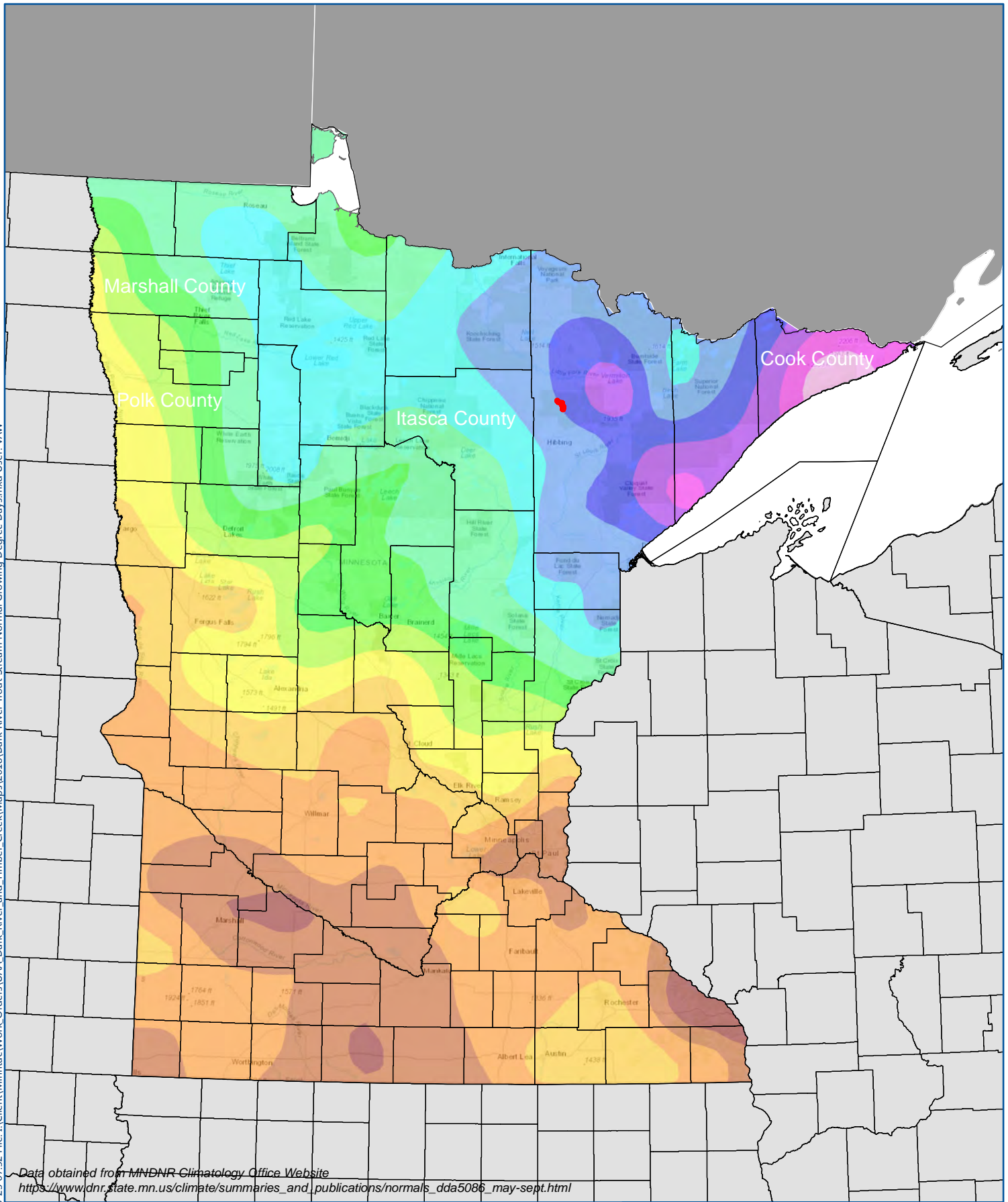
MINNESOTA CROP PRODUCTIVITY INDEX RATING COMPARISON U. S. Steel Minntac Saint Louis County, Minnesota

Large Figure 22



- Dark River Trout Stream
- USDA Plant Hardiness Zones
- ZONE
- 2b: -45 to -40 F
  - 3a: -40 to -35 F
  - 3b: -35 to -30 F
  - 4a: -30 to -25 F
  - 4b: -25 to -20 F
  - 5a: -20 to -15 F
  - 5b: -15 to -10 F
  - 6a: -10 to -5 F
  - 6b: -5 to 0 F
  - 7a: 0 to 5 F
  - 7b: 5 to 10 F
  - 8a: 10 to 15 F
  - 8b: 15 to 20 F
  - 9a: 20 to 25 F
  - 9b: 25 to 30 F
  - 10a: 30 to 35 F
  - 10b: 35 to 40 F
  - 11b: 45 to 50 F
  - 11a: 40 to 45 F





Data obtained from MNDNR Climatology Office Website  
[https://www.dnr.state.mn.us/climate/summaries\\_and\\_publications/normals\\_dda5086\\_may-sept.html](https://www.dnr.state.mn.us/climate/summaries_and_publications/normals_dda5086_may-sept.html)



- Dark River Trout Stream**
- Normal Growing Degree Days Base 50/86 May-Sept. 1981-2010 (Degrees F)**
- |               |               |               |
|---------------|---------------|---------------|
| 1,294 - 1,300 | 1,501 - 1,600 | 2,101 - 2,200 |
| 1,301 - 1,400 | 1,601 - 1,700 | 2,201 - 2,300 |
| 1,401 - 1,500 | 1,701 - 1,800 | 2,301 - 2,400 |
|               | 1,801 - 1,900 | 2,401 - 2,500 |
|               | 1,901 - 2,000 | 2,501 - 2,600 |
|               | 2,001 - 2,100 | 2,601 - 2,700 |



0 25 50  
Miles

**NORMAL CORN GROWING DEGREE DAYS**  
**MAY- SEPTEMBER**  
U. S. Steel Minntac  
Saint Louis County, Minnesota  
Large Figure 24

## Appendices

## **Appendix A**

**MPCA Letter to U. S. Steel dated April 5, 2018**

April 5, 2018

Ms. Chrissy Bartovich  
Director-Environmental  
Minnesota Ore Operations  
United States Steel Corporation  
P.O. Box 417  
Mountain Iron, MN 55768

Re: U.S. Steel's Use Attainability Analysis/Use and Value Determination and Site Specific Standard Requests

Ms. Bartovich:

As discussed in our March 6 phone call, the Minnesota Pollution Control Agency (MPCA) is providing this letter to document additional information needs and the path forward for U.S. Steel's Use Attainability Analysis/Use and Value Determination (UAA/UVd) and Site Specific Standard Requests for reaches near U.S. Steel's Minntac Tailings Basin.

The MPCA understands that at this time U.S. Steel plans to submit revised/complete petitions requesting the removal of certain designated uses through a UAA/UVd and site specific standards as follows:

Reach	Uses to Remove	SSS Requested
Timber Creek	3C, 4A	4B
Dark River	1B, 3C, 4A	4B
Dark Lake	3C, 4A	4B
Sand River	3C, 4A <sup>1</sup>	4B
Admiral Lake	3C, 4A	4B
Twin Lakes	3C, 4A <sup>1</sup>	4B

<sup>1</sup>The MPCA understands that U.S. Steel does not intend to alter the wild rice use. The path forward to remove the 4A use in wild rice waters may be affected by the outcome of the MPCA's wild rice rulemaking.

The table above does not include wetlands surrounding the tailings basin, although they were included in U.S. Steel's prioritization list for removal of Class 3C and 4A, and a SSS for 4B. The situation for wetlands is different than for the streams and lakes. These wetlands do not have use class designations of 3C, 4A or 4B. Wetlands that are not listed in Minn. R. 7050.0470 are designated as classes 2D, 3D, 4C, 5 and 6 (see Minn. R. 7050.0425). Therefore, the uses altered would need to be 3D and 4C for these wetlands; while Class 4C incorporates the Class 4A and Class 4B standards, it is a separate use class. Removing the 3D use is relatively straightforward, but the 4C use is complicated because of the way it ties the 4A and 4B standards into one use class (see Minn. R. 7050.0224, subp. 4). Therefore, the removal of the 4A uses, while retaining the 4B uses (which are necessary for wildlife protection), is not possible without changing the use class. MPCA is currently considering the options for addressing this, and would like to discuss this issue further with U.S. Steel.

Both removal of a designated use (through UAA/UVD) and changing a standard (through SSS) require certain demonstrations as laid out in state and federal regulations. We recommend that U.S. Steel consult 40 CFR 131.10(k) and *Water Quality Standards Regulatory Revisions*; Final Rule, published August 21, 2015 - 80 FR 50126 for information on conducting a Use and Value Determination, which is the appropriate demonstration for removing or revising a non-101(a)(2) use. We recommend you consult <https://www.pca.state.mn.us/water/site-specific-water-quality-standards> for information on site-specific standards.

In particular, we note that both removal of a designated use (through UAA/UVD) or changing a standard (through SSS) requires the approval of EPA. EPA requires states to make certain demonstrations, which include, but are not necessarily limited to, the following items:

- That all other standards, including narrative standards, will be met in the reaches that are the subject of the petitions;
- That the removal of the use or the change to the standard will not prevent the attainment and maintenance of the water quality standards of downstream waters, per 131.10(b) and Minn. R. 7050.0155;
  - Having different standards for adjoining reaches does not necessarily show that downstream standards will not be met, but MPCA must be able to demonstrate that Minntac's effluent, under the conditions assumed if the petitions are successful, will not cause or contribute to an exceedance of water quality standards in downstream waters;
- When removing a use, that the specified use is not an existing use (on or after November 28, 1975) in the reach;
- To develop a site-specific standard for wildlife: That the sensitivities of the species are different than those assumed when the statewide standard was developed or that the specifics of the site are such that the relevant pollutants are less bioavailable or less toxic.

In order to be successful, U.S. Steel should ensure that the data and documentation provided support the MPCA's ability to make the above demonstrations. If the data does not support the demonstration, the MPCA would not be able to proceed with the removal of the use or a site-specific standard and submit it to EPA for approval.

U.S. Steel has already provided information to the MPCA, and the rest of this letter discusses the additional data and demonstrations that MPCA believes will be necessary to support the petition. MPCA requests additional information for the following specific areas, to support the demonstrations described above:

- Biological Monitoring – Biological monitoring must be consistent with the MPCA's standard operating procedure and the information in the most recent *Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List*, particularly Appendix F. MPCA staff would like to work with you to cooperatively develop a study design.

At this time, we believe the information listed below will be needed. The study design and exact locations should be discussed further to ensure that the data collected will satisfy the UAA and SSS needs. In addition, in order to ensure that the data collected accurately assesses the biology of the

relevant reaches, MPCA would like to work with U.S. Steel to ensure that MPCA's standard procedures and methods are being followed. This may include some training for U.S. Steel's biological survey contractor, or collaborative visits to some of the sites by MPCA biological monitoring staff and U.S. Steel's biological survey contractor. We will work with you to develop a plan for this collaboration so that all sampling can occur during August, our recommended timeframe for biological sampling.

- Additional biological monitoring on the Dark River and Timber Creek;
- Biological monitoring should be performed at reference sites outside the influence of the tailings basin. Two possible locations are McNiven Creek – MPCA sampling station 05RN061 (to compare to Timber Creek) and Sturgeon River, East Branch – MPCA sampling station 05RN034 (to compare to the Dark River). The MPCA intends to sample 05RN034 this summer. It may also be useful to sample a site that can serve as a reference for the cold water section of the Dark River.
- If possible, a biological monitoring station on the Sand River should be established at the furthest upstream site where the site conditions allow to assess whether aquatic life is being impacted.
- Additional Pollutant Monitoring
  - Monthly monitoring of specific conductivity, TDS, sulfate, bicarbonate and hardness in the upper Dark River (SD001 and D-1), Dark Lake, Dark River trout reach, Timber Creek, headwaters of Sand River and Admiral Lake.
- Demonstration of protection of other standards and downstream uses
  - Consideration of the Class 3B use on the trout reach of the Dark River, particularly the hardness standard - this has not been included in the information received by MPCA to date;
  - Data for specific conductivity, TDS, hardness and bicarbonate, on downstream waters where the Class 3 and 4 designated uses would remain unchanged, to demonstrate that the current standards are met;
  - TDS and sulfate information demonstrating the proposed site specific standards would be met in all requested waters, including the headwaters of Sand River, Admiral Lake, Timber Creek, and Dark Lake;
  - TDS, specific conductivity, bicarbonate and sulfate information demonstrating the current 4C standards and the proposed site specific standards would be met in representative wetland locations (identified below);
  - Information demonstrating that the drinking water use in groundwater would still be protected if the Class 1B use is removed from the trout reach of the Dark River;
  - Information demonstrating that applicable Class 2D, Class 5, and Class 6 uses, as well as the narrative in Minn. R. 7050.0186, Subpart 1, are met in wetlands surrounding the tailings basin. MPCA proposes three representative locations, one on each of the west, north, and east sides of the basin. Possible locations could include, as referenced from the 2017 Tailings Basin Status Report (February 2018), Inspection points 1, 16, and 29; and
  - Information demonstrating that the Class 2 narrative standard (Minn. R. 7050.0150, subp. 3) is being met in all surface waters affected by the tailings basin.

Ms Chrissy Bartovich  
April 5, 2018

Given the discussions and changes in approach, MPCA believes that it makes sense for U.S. Steel to prepare a cohesive petition package that includes a full demonstration of the appropriateness of the removal of the use and the site-specific standard with appropriate/required supporting data. Once we receive that package, including the information outlined above, we will be able to proceed with evaluating the petition for completeness and further processing.

Sincerely,

A handwritten signature in black ink that reads "Todd Biewen". Below the name, the word "for" is written in a smaller, cursive script.

Catherine Neuschler, Manager  
Water Assessment and Environmental Information Section  
Environmental Analysis and Outcomes Division

CN:cbg

## **Appendix B**

### **Dark River Monitoring at D-1A**

Appendix B: Dark River Monitoring at D-1A

Date	Flow	
	cfs	gpm
11/8/2011	27.65	12,410.18
11/23/2011	31.91	14,322.20
1/6/2012	13.47	6,045.76
6/5/2012	41.92	18,815.00
9/19/2012	5.29	2,374.32
11/27/2012	13.63	6,117.57
1/10/2013	2.48	1,113.10
5/17/2013	42.08	18,886.82
9/12/2013	5.29	2,374.32
11/25/2013	8.48	3,806.09
1/24/2014	7.24	3,249.54
5/23/2014	66.09	29,663.25
9/11/2014	9.52	4,272.87
12/8/2014	14.81	6,647.19
1/12/2015	19.34	8,680.40
6/1/2018	28.12	12,621.13
6/22/2018	26.86	12,055.61
7/6/2018	37.81	16,970.31
8/8/2018	8.54	3,833.02

Month	Flow (gpm)				Average
January	6,045.76	1,113.10	3,249.54	8,680.40	4,772.20
February	--	--	--	--	--
March	--	--	--	--	--
April	--	--	--	--	--
May	18,886.82	29,663.25	--	--	24,275.04
June	18,815.00	12,621.13	12,055.61	--	14,497.25
July	16,970.31	--	--	--	16,970.31
August	3,833.02	--	--	--	3,833.02
September	2,374.32	2,374.32	4,272.87	--	3,007.17
October	--	--	--	--	--
November	12,410.18	14,322.20	6,117.57	3,806.09	9,164.01
December	6,647.19	--	--	--	6,647.19
Annual Average Flow				10,396	

Appendix B: Dark River Monitoring at D-1A

Parameter	Units	Date						
		11/8/2011	11/23/2011	1/6/2012	6/5/2012	9/19/2012	11/27/2012	1/10/2013
Alkalinity, Bicarbonate as CaCO <sub>3</sub>	mg/L	288	--	308	119	206	252	251
Aluminum, total	µg/L	--	--	--	--	--	--	--
Ammonia, unionized as N	µg/L	--	--	--	--	--	--	--
Antimony, total	µg/L	--	--	--	--	--	--	--
Arsenic, total	µg/L	--	--	--	--	--	--	--
Bicarbonates as HCO <sub>3</sub>	meq/L	--	--	--	--	--	--	--
BOD, 5 Day (Low Level)	mg/L	--	--	--	--	--	--	--
Boron	mg/L	--	--	--	--	--	--	--
Bromide	mg/L	--	--	--	--	--	--	--
Cadmium, total	µg/L	--	--	--	--	--	--	--
Calcium	mg/L	85.2	--	84.9	37.4	57	68.6	75.8
Chloride	mg/L	38.2	--	48.1	17.2	26.4	38.6	43.7
Chlorophyll a	µg/L	--	--	--	--	--	--	--
Chlorophyll a - nonPC	µg/L	--	--	--	--	--	--	--
Chromium +3, total	µg/L	--	--	--	--	--	--	--
Chromium +6, total	µg/L	--	--	--	--	--	--	--
Chlorine, total residual	µg/L	--	--	--	--	--	--	--
Cobalt, total	µg/L	--	--	--	--	--	--	--
Coliform bacteria, total	MPN/100 mL	--	--	--	--	--	--	--
Copper, total	µg/L	--	--	--	--	--	--	--
Cyanide, free	µg/L	--	--	--	--	--	--	--
Dissolved Oxygen	mg/L	12.3	--	10.6	7.8	--	--	--
Escherichia (E.) coli	MPN/100 mL	--	--	--	--	--	--	--
Fluoride	mg/L	--	--	--	--	--	--	--
Hardness	mg/L	764	--	788	311	496	636	702
Lead, total	µg/L	--	--	--	--	--	--	--
Magnesium	mg/L	134	--	140	52.8	86	113	124
Mercury, total	ng/L	--	--	--	--	--	--	--
Nickel, total	µg/L	--	--	--	--	--	--	--
Nitrogen, Ammonia	mg/L	--	--	--	--	--	--	--
Nitrogen, Ammonia (unionized)	mg/L	--	--	--	--	--	--	--
Nitrogen, NO <sub>3</sub> + NO <sub>2</sub>	mg/L	--	--	--	--	--	--	--
Oil (Oil and Grease)	µg/L	--	--	--	--	--	--	--
pH	SU	8.0	8.5	7.8	7.51	8.01	8.03	7.63
Phosphorus	mg/L	0.019	--	0.015	0.025	0.014	0.01	0.009
Potassium	mg/L	--	--	--	--	--	--	--
Selenium, total	µg/L	--	--	--	--	--	--	--
Silver, total	µg/L	--	--	--	--	--	--	--
Specific Conductance	µS/cm	1333	1373	1412	587	877	1161	1178
Sodium	mg/L	26.8	--	29.2	12.0	19.2	26.1	29.4
Sodium as % of total cations (expressed as meq/L)	%	--	--	--	--	--	--	--
Sulfate	mg/L	426		489	167	244	361	399
Temperature	°C	3.6	1.0	0.2	20.6	11.64	0.1	0.06
Thallium, total	µg/L	--	--	--	--	--	--	--
Total Dissolved Solids	mg/L	986	--	1040	460	576	829	796
Total Organic Carbon	mg/L	--	--	--	--	--	--	--
Total Suspended Solids	mg/L	--	--	--	--	--	--	--
Zinc, total	µg/L	--	--	--	--	--	--	--

Notes:

(1) Red text indicates non-detect samples. The number shown is half the detection limit for calculation purposes.

Appendix B: Dark River Monitoring at D-1A

Parameter	Units	Date						
		5/17/2013	9/12/2013	11/25/2013	1/24/2014	5/23/2014	9/11/2014	12/8/2014
Alkalinity, Bicarbonate as CaCO <sub>3</sub>	mg/L	126	208	287	312	101	208	260
Aluminum, total	µg/L	--	--	--	--	--	--	--
Ammonia, unionized as N	µg/L	--	--	--	--	--	--	--
Antimony, total	µg/L	--	--	--	--	--	--	--
Arsenic, total	µg/L	--	--	--	--	--	--	--
Bicarbonates as HCO <sub>3</sub>	meq/L	--	--	--	--	--	--	--
BOD, 5 Day (Low Level)	mg/L	--	--	--	--	--	--	--
Boron	mg/L	--	--	--	--	--	--	--
Bromide	mg/L	--	--	--	--	--	--	--
Cadmium, total	µg/L	--	--	--	--	--	--	--
Calcium	mg/L	36.8	51.6	74.8	78	29.7	57.2	77
Chloride	mg/L	17.5	25.0	41.7	40.9	13.6	27.4	43.2
Chlorophyll a	µg/L	--	--	--	--	--	--	--
Chlorophyll a - nonPC	µg/L	--	--	--	--	--	--	--
Chromium +3, total	µg/L	--	--	--	--	--	--	--
Chromium +6, total	µg/L	--	--	--	--	--	--	--
Chlorine, total residual	µg/L	--	--	--	--	--	--	--
Cobalt, total	µg/L	--	--	--	--	--	--	--
Coliform bacteria, total	MPN/100 mL	--	--	--	--	--	--	--
Copper, total	µg/L	--	--	--	--	--	--	--
Cyanide, free	µg/L	--	--	--	--	--	--	--
Dissolved Oxygen	mg/L	--	--	11.7	--	--	--	--
Escherichia (E.) coli	MPN/100 mL	--	--	--	--	--	--	--
Fluoride	mg/L	--	--	--	--	--	--	--
Hardness	mg/L	306	437	678	710	236	498	685
Lead, total	µg/L	--	--	--	--	--	--	--
Magnesium	mg/L	51.9	74.8	119	125	39.4	86.2	120
Mercury, total	ng/L	--	--	--	--	--	--	--
Nickel, total	µg/L	--	--	--	--	--	--	--
Nitrogen, Ammonia	mg/L	--	--	--	--	--	--	--
Nitrogen, Ammonia (unionized)	mg/L	--	--	--	--	--	--	--
Nitrogen, NO <sub>3</sub> + NO <sub>2</sub>	mg/L	--	--	--	--	--	--	--
Oil (Oil and Grease)	µg/L	--	--	--	--	--	--	--
pH	SU	7.74	7.83	7.88	7.60	7.50	8.04	7.99
Phosphorus	mg/L	0.03	0.05	0.01	0.05	0.05	--	--
Potassium	mg/L	--	--	--	--	--	--	--
Selenium, total	µg/L	--	--	--	--	--	--	--
Silver, total	µg/L	--	--	--	--	--	--	--
Specific Conductance	µS/cm	602	823.1	1239	1319	488	897	1006
Sodium	mg/L	12.5	17.9	29.8	29.3	9.8	19.6	28.6
Sodium as % of total cations (expressed as meq/L)	%	--	--	--	--	--	--	--
Sulfate	mg/L	164	236	392	390	125	259	399
Temperature	°C	13.2	16.65	0.08	0.0	13.1	11.18	0.0
Thallium, total	µg/L	--	--	--	--	--	--	--
Total Dissolved Solids	mg/L	416	605	865	920	348	658	901
Total Organic Carbon	mg/L	--	--	--	--	--	--	--
Total Suspended Solids	mg/L	--	--	--	--	--	--	--
Zinc, total	µg/L	--	--	--	--	--	--	--

Notes:

(1) Red text indicates non-detect samples. The number shown is half the detection limit for calculation purposes.

Appendix B: Dark River Monitoring at D-1A

Parameter	Units	Date						
		1/12/2015	4/3/2018	5/17/2018	5/30/2018	6/1/2018	6/22/2018	7/6/2018
Alkalinity, Bicarbonate as CaCO <sub>3</sub>	mg/L	310	--	136	156	173	--	196
Aluminum, total	µg/L	--	85.5	--	--	--	--	--
Ammonia, unionized as N	µg/L	--	5	--	--	--	--	--
Antimony, total	µg/L	--	0.25	--	--	--	--	--
Arsenic, total	µg/L	--	0.86	--	--	--	--	--
Bicarbonates as HCO <sub>3</sub>	meq/L	--	--	2.7	3.1	3.5	--	3.9
BOD, 5 Day (Low Level)	mg/L	--	--	--	--	--	--	--
Boron	mg/L	--	--	0.05	--	0.05	--	0.05
Bromide	mg/L	--	--	--	0.10	--	0.10	0.23
Cadmium, total	µg/L	--	0.10	--	--	--	--	--
Calcium	mg/L	83.9	--	36.1	40.8	45.1	--	53.0
Chloride	mg/L	46.0	38.0	16.5	19.5	21.7	--	22.9
Chlorophyll a	µg/L	--	--	--	--	--	--	--
Chlorophyll a - nonPC	µg/L	--	--	--	--	--	--	--
Chromium +3, total	µg/L	--	10.0	--	--	--	--	--
Chromium +6, total	µg/L	--	10.0	--	--	--	--	--
Chlorine, total residual	µg/L	--	10	--	--	--	--	--
Cobalt, total	µg/L	--	0.41	--	--	--	--	--
Coliform bacteria, total	MPN/100 mL	--	387.3	--	--	--	--	--
Copper, total	µg/L	--	1.3	--	--	--	--	--
Cyanide, free	µg/L	--	8.0	--	--	--	--	--
Dissolved Oxygen	mg/L	--	11.1	--	--	--	--	--
Escherichia (E.) coli	MPN/100 mL	--	2.0	--	--	--	--	--
Fluoride	mg/L	--	--	--	0.27	--	0.37	0.39
Hardness	mg/L	723	--	300	347	383.0	--	457.5
Lead, total	µg/L	--	0.25	--	--	--	--	--
Magnesium	mg/L	125	--	51	59.6	65.7	--	79.0
Mercury, total	ng/L	--	1.04	--	--	--	--	--
Nickel, total	µg/L	--	0.25	--	--	--	--	--
Nitrogen, Ammonia	mg/L	--	--	--	0.055	--	0.12	0.055
Nitrogen, Ammonia (unionized)	mg/L	--	--	--	0.0050	--	0.0050	0.0050
Nitrogen, NO <sub>3</sub> + NO <sub>2</sub>	mg/L	--	--	--	0.025	--	0.025	0.025
Oil (Oil and Grease)	µg/L	--	1450	--	--	--	--	--
pH	SU	7.36	7.83	--	7.7	8.1	7.9	7.9
Phosphorus	mg/L	--	--	--	--	--	--	--
Potassium	mg/L	--	--	4	4.4	4.7	--	4.4
Selenium, total	µg/L	--	1.2	--	--	--	--	--
Silver, total	µg/L	--	0.10	--	--	--	--	--
Specific Conductance	µS/cm	1305	1358		532	732	789	863
Sodium	mg/L	30.8	--	12.0	13.9	15.1	--	17.5
Sodium as % of total cations (expressed as meq/L)	%	--	--	11.6	11.7	11.6	--	11.4
Sulfate	mg/L	423	--	155	186	216	--	234
Temperature	°C	0.0	0.5	--	20.9	19.4	22.9	23.0
Thallium, total	µg/L	--	0.10	--	--	--	--	--
Total Dissolved Solids	mg/L	919	--	370	446	504	--	582
Total Organic Carbon	mg/L	--	--	--	14.8	--	18.5	18.4
Total Suspended Solids	mg/L	--	5.6	--	6.0	--	5.2	7.9
Zinc, total	µg/L	--	3.0	--	--	--	--	--

Notes:

(1) Red text indicates non-detect samples. The number shown is half the detection limit for calculation purposes.

Appendix B: Dark River Monitoring at D-1A

Parameter	Units	Date			Number of Samples	Minimum	Maximum	Average	Median
		7/9/2018	7/24/2018	8/8/2018					
Alkalinity, Bicarbonate as CaCO <sub>3</sub>	mg/L	--	--	219	19	101	312	217	208
Aluminum, total	µg/L	--	--	--	1	85.5	85.5	85.5	85.5
Ammonia, unionized as N	µg/L	--	--	--	1	< 10	< 10	< 10	< 10
Antimony, total	µg/L	--	--	--	1	< 0.5	< 0.5	< 0.5	< 0.5
Arsenic, total	µg/L	--	--	--	1	0.86	0.86	0.86	0.86
Bicarbonates as HCO <sub>3</sub>	meq/L	--	--	4.4	5	3	4	4	4
BOD, 5 Day (Low Level)	mg/L	1.0	1.0	1.2	3	< 2.0	< 2.4	1.07	< 2.0
Boron	mg/L	--	--	0.075	4	< 0.1	< 0.15	0.056	< 0.1
Bromide	mg/L	--	--	0.10	4	< 0.20	0.23	0.13	< 0.20
Cadmium, total	µg/L	--	--	--	1	< 0.20	< 0.20	< 0.20	< 0.20
Calcium	mg/L	--	--	51.8	19	30	85	59	57
Chloride	mg/L	--	--	23.3	20	14	48	30	27
Chlorophyll a	µg/L	2.8	1.1	0.5	3	< 1.0	2.8	1.5	1.1
Chlorophyll a - nonPC	µg/L	3.9	1.3	0.5	3	< 1.0	3.9	1.9	1.3
Chromium +3, total	µg/L	--	--	--	1	< 20.0	< 20.0	< 20.0	< 20.0
Chromium +6, total	µg/L	--	--	--	1	< 20.0	< 20.0	< 20.0	< 20.0
Chlorine, total residual	µg/L	--	--	--	1	< 20	< 20	< 20	< 20
Cobalt, total	µg/L	--	--	--	1	0.41	0.41	0.41	0.41
Coliform bacteria, total	MPN/100 mL	--	--	--	1	387.3	387.3	387.3	387.3
Copper, total	µg/L	--	--	--	1	1.3	1.3	1.3	1.3
Cyanide, free	µg/L	--	--	--	1	< 16.0	< 16.0	< 16.0	< 16.0
Dissolved Oxygen	mg/L	--	--	--	5	7.8	12.3	10.7	11.1
Escherichia (E.) coli	MPN/100 mL	--	--	--	1	2.0	2.0	2.0	2.0
Fluoride	mg/L	--	--	0.39	4	0.27	0.39	0.36	0.38
Hardness	mg/L	--	--	479.6	19	236	788	523	496
Lead, total	µg/L	--	--	--	1	< 0.5	< 0.5	< 0.5	< 0.5
Magnesium	mg/L	--	--	85.1	19	39.4	140	91.1	86.0
Mercury, total	ng/L	--	--	--	1	1.04	1.04	1.04	1.04
Nickel, total	µg/L	--	--	--	1	< 0.5	< 0.5	< 0.5	< 0.5
Nitrogen, Ammonia	mg/L	0.21	0.055	0.13	6	< 0.11	0.21	0.104	0.0875
Nitrogen, Ammonia (unionized)	mg/L	0.024	0.0050	0.0050	6	< 0.010	0.024	0.0082	< 0.010
Nitrogen, NO <sub>3</sub> + NO <sub>2</sub>	mg/L	0.020	0.025	0.0235	6	< 0.05	0.020	0.024	< 0.05
Oil (Oil and Grease)	µg/L	--	--	--	1	<2900	<2900	<2900	<2900
pH	SU	8.26	8.02	8.21	23	7.4	8.5	7.9	7.9
Phosphorus	mg/L	0.029	0.020	0.019	14	0.009	< 0.1	0.0250	0.0195
Potassium	mg/L	--	--	4.2	5	4.0	4.7	4.3	4.4
Selenium, total	µg/L	--	--	--	1	1.2	1.2	1.2	1.2
Silver, total	µg/L	--	--	--	1	< 0.20	< 0.20	< 0.20	< 0.20
Specific Conductance	µS/cm	846	831	930	23	488	1412	977	897
Sodium	mg/L	--	--	17.9	19	9.8	30.8	20.9	19.2
Sodium as % of total cations (expressed as meq/L)	%	--	--	11.3	5	11.3	11.7	11.5	11.6
Sulfate	mg/L	--	--	254	19	125	489	290	254
Temperature	°C	27.7	21.0	20.8	23	0.0	27.7	10.8	11.6
Thallium, total	µg/L	--	--	--	1	< 0.20	< 0.20	< 0.20	< 0.20
Total Dissolved Solids	mg/L	--	--	656	19	348	1040	678	656
Total Organic Carbon	mg/L	--	--	16.8	4	14.8	18.5	17.1	17.6
Total Suspended Solids	mg/L	--	--	2.4	5	2.4	7.9	5.4	5.6
Zinc, total	µg/L	--	--	--	1	< 6.0	< 6.0	< 6.0	< 6.0

Notes:

(1) Red text indicates non-detect samples. The number shown is half the detection limit for calculation purposes.

## **Appendix C**

### **Minnesota Historical Society List of Queried Documents**

## Appendix C: Minnesota Historical Society List of Queried Documents

Location	Box	Item
126.B.17.9B	5	Exhibits, [ca.1953]. 1 folder.
126.B.17.9B	5	WPC-15: Proposed amendments to Agency Regulation WPC-15 relating to criteria for classification of interstate waters and establishment of standards of water quality and purity. Transcript, May 22, 1973. 1 folder.
126.B.17.9B	5	WPC-14, WPC-23, WPC-15: Amendments to standards for interstate waters. Transcripts, May 31, 1973. 2 folders.
126.B.17.11B	7	Establishment of water classification and standards of water and effluent quality and purity. Proposed regulation WPC-23, November 1968. Fiche nos. 67-83.
126.B.17.11B	7	Establishment of water quality and purity standards for interstate waters of Minnesota, WPC-15. April 20, 1967 in Rochester; April 21 in Ortonville; April 25 in St. Cloud; April 26 in Duluth; and April 27, 1967 in St. Paul. Fiche nos. 84-102.
126.B.17.11B	7	Classification for underground waters of the state and establishment of standards for waste disposal. Proposed regulation WPC-22, February 22, 1973. Fiches nos. 103-113.
126.B.17.12F	8	Proposed adoption of MPCA rules 1 (amended rules of procedure), 2 (interim permits), and 3 (declaration of emergency), November 10, 1969. Fiche nos. 114-115.
126.B.17.12F	8	Adoption of water use classifications, establishment of standards for effluents discharged an/or affecting interstate waters, revocation of permits, and issuance of ordres of abatement of pollution thereof. WPC-25, 26, 27, 28, 29, 30, 31, and 32, July 13, 1970. Fiche nos. 116-123.
126.B.17.12F	8	Classification of waters and establishment of standards of water and effluent quality and purity. Proposed regulations WPC-24, 37, and 38. Revocation of regulations WPC-14, 15, and 23. Amendment of regulation WPC-25. March 14-16, 1973. Fiche nos. 165-178.
126.B.17.12F	8	Standards of the State of Minnesota governing interstate waters within the state, WPC-15. March 9, April 13, May 11, and July 13, 1970 hearings in Minneapolis. Fiche nos. 178-179.

## **Appendix D**

### **Summary of Water Supply Appropriation Permits in Minnesota**

Appendix D: Summary of Water Supply Appropriation Permits in Minnesota

Use Type	Total Number of Permits	Permit Status		Permit Total Volume (gpm)				Installation Pumping Rate (gpm)				Resource Category (% Each)		Resource Type (% Each)									
		Number of Active Permits	Number of Inactive Permits	Minimum	Maximum	Average	Median	Minimum	Maximum	Average	Median	Surface Water	Ground-water	Ditch	Dug Pit / Holding Pond	Ground-water	Lake	Quarry / Mine	Sand / Gravel Pit	Stream / River	Wetland	Other	Unknown
Campground/ Wayside/ Highway Rest Area Water Supply	104	25	79	0	38.1	6.05	3.81	0	600	51.46	30.0	0.96%	99.04%	0%	0%	99.04%	0.96%	0%	0%	0%	0%	0%	0%
Commercial/ Institutional Water Supply	396	192	204	0	3,957	176.6	22.83	0	8,700	376	130	2.3%	97.7%	0%	0.76%	97.7%	0.51%	0%	0%	1.01%	0%	0%	0%
Fire Protection Water Supply	54	21	33	0	76,104	2,305	5.23	0	3,500	919	500	40.7%	59.3%	1.85%	0%	59.3%	27.8%	0%	0%	9.26%	1.85%	0%	0%
Municipal/ Public Water Supply	3,298	2,908	390	0	237,823	1,532	304	0	240,000	952	100	2.4%	97.6%	0.03%	0.03%	97.6%	0.76%	0.30%	0%	1.09%	0%	0%	0.182%
Other Water Supply	1,122	2	1,120	1.9	57.1	30.0	30.5	0	300	150	150	5.0%	95.0%	0%	0.18%	95.0%	3.39%	0%	0%	0.89%	0.09%	0.0000%	0.45%
Private Water Supply	583	254	329	0	647	23.4	9.51	0	1,600	142	66.5	1.4%	98.6%	0%	0%	98.6%	0.69%	0%	0%	0.51%	0%	0%	0.17%
Rural Water District Supply	62	62	0	50.04	1,299	537	552	0	7,500	548	450	1.6%	98.4%	0%	0%	98.39%	1.61%	0%	0%	0%	0%	0%	0%

## **Appendix E**

### **Summary of Industrial Processing Water Appropriation Permits in Minnesota**

Appendix E: Summary of Industrial Processing Water Appropriation Permits in Minnesota

Use Type	Total Number of Permits	Permit Status		Permit Total Volume (gpm)				Installation Pumping Rate (gpm)				Resource Category (% Each)		Resource Type (% Each)									
		Number of Active Permits	Number of Inactive Permits	Minimum	Maximum	Average	Median	Minimum	Maximum	Average	Median	Surface Water	Groundwater	Ditch	Dug Pit / Holding Pond	Groundwater	Lake	Quarry / Mine	Sand / Gravel Pit	Stream / River	Wetland	Other	Unknown
Agricultural/ Food Processing	456	229	227	0	5,708	449.0	114	0	8,000	524.6	200	5.3%	94.7%	0.4%	0.2%	94.7%	1.1%	0%	0%	3.5%	0%	0%	0%
Industrial Process Cooling - Once Through	92	44	48	2	47,565	1,922.8	251	5	42,000	2,039.5	325	9.8%	90.2%	0%	0%	90.2%	4.3%	0%	0%	5.4%	0%	0%	0%
Metal Processing	103	53	50	4	9,513	613.0	153	0	10,000	684.2	225	2.9%	97.1%	0%	1.0%	97.1%	1.0%	0%	0%	1.0%	0%	0%	0%
Mine Processing	166	85	81	0	201,674	9,895.7	1,284	0	95,000	3,556.0	800	70.9%	29.1%	0.6%	7.3%	29.1%	20.0%	31.5%	0%	9.7%	1.8%	0%	0%
Non-Metallic Processing (Rubber, Plastic, Glass, Concrete)	202	95	107	0	1,332	122.5	25	0	4,000	324.9	165	13.9%	86.1%	0.5%	4.5%	86.1%	1.5%	1.0%	0.5%	5.9%	0%	0%	0%
Other Industrial Processing	714	61	653	0	1,332	192.1	48	0	4,000	419.8	250	21.0%	79.0%	0.6%	0.8%	79.0%	6.2%	0.6%	0.3%	7.4%	1.0%	0%	4.2%
Petroleum-Chemical Processing/ Ethanol	126	92	34	0	4,996	965.9	632	0	10,700	608.1	400	6.3%	93.7%	0.8%	1.6%	93.7%	0%	0.8%	0%	3.2%	0%	0%	0%
Sand and Gravel Washing	505	273	232	0	3,134	148.0	57	0	12,000	840.2	550	60.0%	40.0%	0.4%	24.2%	40.0%	3.8%	14.3%	3.8%	11.7%	1.8%	0.2%	0%
Wood Products Processing	55	29	26	0	47,565	3,370.5	95	0	42,000	4,533.2	500	30.9%	69.1%	0%	0%	69.1%	7.3%	0%	0%	23.6%	0%	0%	0%

## **Appendix F**

### **Summary of Agricultural Irrigation Water Appropriation Permits in Minnesota**

Appendix F: Summary of Agricultural Irrigation Water Appropriation Permits in Minnesota

Use Type	Total Number of Permits	Permit Status		Permit Total Volume (gpm)				Installation Pumping Rate (gpm)				Resource Category (% Each)		Resource Type (% Each)									
		Number of Active Permits	Number of Inactive Permits	Minimum	Maximum	Average	Median	Minimum	Maximum	Average	Median	Surface Water	Groundwater	Ditch	Dug Pit / Holding Pond	Groundwater	Lake	Quarry / Mine	Sand / Gravel Pit	Stream / River	Wetland	Other	Unknown
Agricultural Crop Irrigation	12458	7691	4767	0	1,689	72.5	68	0	9,999	591.9	600	23.4%	76.6%	1.2%	5.3%	76.6%	4.2%	0.3%	0.1%	10.3%	1.3%	0%	0.7%
Nursery Irrigation	175	106	69	0	304	51.9	27	0	3,300	356.5	200	24.0%	76.0%	1.1%	5.7%	76.0%	5.7%	0%	0%	8.0%	3.4%	0%	0%
Orchard/Vineyard Irrigation	50	35	15	1	43	11.8	8	30	800	226.6	143	42.0%	58.0%	0%	18.0%	58.0%	10.0%	0%	0%	10.0%	4.0%	0%	0%
Pasture Irrigation	6	4	2	6	33	15.4	8	20	500	231.7	155	50.0%	50.0%	0%	16.7%	50.0%	0%	0%	0%	33.3%	0%	0%	0%
Sod Farm Irrigation	105	63	42	2	371	80.3	51	0	6,000	558.8	500	36%	64%	18.1%	1.9%	63.8%	1.9%	0%	0%	13.3%	1.0%	0%	0%
Wild Rice Irrigation	529	169	360	3	19,024	717.4	190	0	30,500	2,288.7	1,000	97.9%	2.1%	35.9%	1.9%	2.1%	4.3%	0%	0%	52.0%	0.6%	0.2%	3.0%